SOME DETERMINANTS OF WORKER PERFORMANCE :

BUS DRIVERS

IN THE SCOTTISH BUS GROUP

BY

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ABSTRACT

This thesis reports the results of a major survey into the determinants of bus driver performance. Over 600 drivers in the Scottish Bus Group were given a battery of three psychological tests: (i) the Ingleton Word Recognition Test, (ii) the IPAT Culture Fair test of "g" and (iii) the Cattell 16PF. Scores on these were factor analysed along with age to give six second-order factors. Over forty measures of work performance were also collected for each driver; these were factor analysed and six factors emerged. Factor scores from the two analyses were correlated and the main dimensions of personality and performance determined. The thesis also presents a review of the history and structure of the British bus industry, and of the role and duties of the bus driver. Methodological issues in the research also receive detailed discussion. The results have already started to be applied in the selection of new drivers by the Scottish Bus Group.

I declare that this thesis has been composed by me and that the work is my own.

INTRODUCTION

This thesis reports on a research project set up by the Scottish Bus Group and the University of Edinburgh in order to study the determinants of bus driver performance. There were two main aims: (i) to find ways of determining driver "performance", in particular whether there are ways of distinguishing between "good" and "bad" drivers; and, as a result, (ii) to improve the procedures for selecting new drivers, which in the past have been fairly amateurish and selective.

The project arose from two directions. From the University side, it was an ideal opportunity to continue the work of C C P Ingleton and colleagues into the determinants of worker performance in the service sector, following from studies of, for example, bank staff, computer repairmen and shop sales staff. From the side of the Scottish Bus Group, there was concern to take action to slow down the traditionally high turnover of labour that characterised the industry in the 1960s and 1970s. It is costly to recruit and train bus drivers, so there were pressures to find out what "types" of person would ideally make a contented, long-serving and (relatively) trouble-free employee. From this, recommendations were to be made as to improving selection methods and to training recruiters to apply them.

This thesis is concerned principally with the research side of the project, the results are in the process of being applied and notes on this are given in an appendix at the end. This research is essentially exploratory, as very little of this nature has been carried out on bus drivers, and is not seeking to prove or disprove any hard and fast hypotheses.

The first chapter provides a background to the industry, charting its development from the latter part of the nineteenth century to the present day, and discussing the problems it has faced in recent years. Declining passenger journeys and rising costs, combined with even faster-rising public subsidies, produced pressure on the present Government to "deregulate" services and increase competition. This, combined with the privatisation of the National Bus Company in England and Wales and the proposed sale of its Scottish counterpart, the Scottish Bus Group, has resulted in a massive change in the structure of the industry.

Chapter two looks at the labour environment, examining various historical aspects of changes in the driver's job and aspects of the industrial relations environment in recent years. The job is then analysed and key elements discussed, as a precursor to later examination of "performance". Recent changes in the nature of the job, which have come hand-in-hand with legislative changes mentioned above, are mentioned.

The third chapter reviews literature on drivers, both of buses and of other vehicles, and finds that research using psychological tests on bus drivers dates back over seventy years. Admittedly, both the tests and the job have changed over the years, but it still provides some justification for the approach used.

Discussion of the actual research starts in the fourth chapter. Some of the major theories underlying the structure of the research are presented. The selection of the sample of drivers for study is discussed, along with the data collection methods - psychological tests and measures of on the job performance - and the rationale for them explained. A section on the data analysis methods used completes the chapter.

Chapters five to seven report on the results and findings of the research, at three levels. The first level provides descriptive statistics of the variables used, in terms of means, standard deviations and frequencies. The second looks at the correlations between variables as a precursor to the third part, the multivariate statistical analysis. This discusses the results of the factor analyses and its implications for the study of determinants of driver performance.

The final chapter reviews each chapter and the research methodology, before concluding by examining the results in the light of the initial objectives.

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CHAPTER ONE

THE HISTORY, DEVELOPMENT AND STRUCTURE OF THE BRITISH BUS INDUSTRY

1.1 Introduction

It is perhaps appropriate to start with a discussion of the history and development of the bus industry in Britain, so as to give an indication of the context in which the research has taken place. This chapter charts the evolution of the industry through various important phases, from its beginnings in the last century through to its present structure. Its performance in recent years is also examined, as are the effects of current legislation. The Scottish situation receives more emphasis than is usual in discussions of this nature, as this chapter forms the background to the project studying bus drivers in the Scottish Bus Group.

1.2 The early years

The origins of the motor bus lie in the horse buses and trams (and later the electric trams) of the 19th century. Horse buses initially developed in London where one George Shillibeer is credited with running the first service in 1829. His idea became so popular that in the intense competition which followed, he became bankrupt. By the mid-1850s, when the London General Omnibus Company was founded, 810 buses were operating in the capital. The spread of horse omnibuses in other cities was accompanied by the horse tramway from the late 1860s. Legislation which eased restrictions on road speeds and the development of electric traction in the mid-1890s helped to bring a period of great expansion of electric tramways in the years which spanned the turn of the century.

The evolution and development of the internal combustion engine led to the appearance of the first motor buses in the last years of the nineteenth century. The first regular services with a petrol-engined bus started in Edinburgh in May 1898, but the idea spread slowly at first and indeed the company itself failed in 1901. The early vehicles were costly to operate and suffered from mechanical problems, breakdowns being frequent occurrences. Gradually these were overcome and the industry enjoyed a period of growth in the years up to the First World War. The London General Omnibus Company started experimenting with motor buses in 1905, had 1,000 running by 1908, and by 1913 they had replaced virtually all the horse buses (Dyos and Aldcroft, 1974). In the rest of the country development was slower and more sporadic. A large number of new operations were started, some of which failed (often through either the owners' lack of bus operating experience or the high costs and unreliability of the early vehicles), and some of which survived and have developed into the operators in existence today. English examples of these include Crosville Motor Services and the Birmingham and Midland Motor Omnibus Co (Midland Red), both of which were constituent companies of the National Bus Company.

In Scotland the Scottish Motor Traction (SMT) Company was founded in Edinburgh in 1905 and ran its first service on 1 January 1906 - from the Mound to Corstorphine. In the years preceding the War the network was expanded to cover many of the towns and villages around Edinburgh and the first scenic tours were operated. SMT was later to become the driving force in expanding and concentrating the industry in much of Scotland, evolving ultimately into the Scottish Bus Group. Another example is Walter Alexander who commenced bus operations in the Falkirk area just before the War. By 1960 the company bearing his name had developed into one of the three largest operators in Britain.

In England, this period saw the first signs of activity of the two major investment and holding companies which were to dominate the industry in later years. These were Thomas Tilling Ltd, a major horse bus operator, and British Electric Traction Ltd (BET), which had invested in many of the electric tramway systems and which was by then diversifying into motor bus operations. Both these groups invested in the larger companies which were aiming for a monopoly of services in their areas. To enable the operators to be free to meet competition from the smaller firms in their areas, the larger holding companies started to divide the country into "spheres of influence", defining clearly the boundaries of the parties. The first area agreement was in Kent in 1916; it was later to extend to most of mainland Britain.

Some of the railway companies were also to invest in motor bus operation, buses being intended to feed traffic to the railway system. The Great Western Railway was one of the first to do this, with bus services starting in Cornwall, the West Midlands, North Wales and the Slough area in the early years of the twentieth century. Others were soon to follow, including the London and North Western Railway, the North Eastern Railway and the Great North of Scotland Railway, the latter operating a number of services on Deeside and in Aberdeenshire.

The First World War temporarily checked the expansion of the motor bus industry, with many vehicles being commandeered for military use, accompanied by a shortage of labour and fuel. This was but a temporary setback - once peace was restored, there followed a period of very rapid growth. Several factors contributed to this, not the least of which was the return to civilian life of large numbers of men skilled in both driving and maintaining buses. Many of these had a desire to start their own bus companies, using war gratuity payments to buy either ex-army vehicles or new ones at low prices. There was also a growing demand for bus transport at this time, accompanied by technical improvements in engine and vehicle construction and the replacement of solid rubber tyres by pneumatic ones. Finally, the licensing system was very weak and often ineffective, making it possible for almost anyone with a bus to start a service.

Four distinct groups of operators emerged in this period, three of which remain to this day. These were the municipal authorities, the territorial or associated companies, the railways and the independents. Local councils tended to be slow in introducing bus services, partly because many had invested heavily in tramways, and partly because prior to 1930 they had to obtain powers to run buses by special Act of Parliament. Despite this, the number of municipalities operating bus services rose from 18 in 1914 to 90 by 1928, mostly within their own boundaries and often with inter-running agreements with other operators, both municipal and private (Dyos and Aldcroft, 1974).

The second group were the large private operators, most of which, by the 1930s, belonged to one of the three large holding companies. In England, as mentioned earlier, BET and Thomas Tilling came to hold substantial interests in over 40 of the largest private companies, and by 1939 had divided the country up into "agreed areas". This effectively gave the associated company in that area a monopoly (ie. freedom from competition from another associated company) and a territory in which to "attack" the small, local competitors. Not only did the two holding companies increase their holdings in the territorial companies, but the territorials themselves expanded, often by buying out smaller independent competitors.

Large-scale amalgamation did not come to Scotland until 1929, and then as a result of legislation regarding the third group of operators - the railways. Although many railway companies had bus fleets (the largest being the Great Western with 300 vehicles by 1928), legislation had restricted the services which they could run, until 1928. In that year the four Railways (Road Transport) Acts enabled them both to run bus services on a large scale and to invest in existing bus companies. The four major companies mostly chose the latter path and acquired substantial financial interests in the larger associated companies.

In 1929 the SMT Company (which had enjoyed substantial growth both before and after the War) was reconstituted. The share capital was doubled to £ 200,000 and the LNER and LMS each took about 25% of the shares. SMT, in addition to operating its own services around Edinburgh, also became a holding company and purchased two other major companies - Walter Alexander and Sons Ltd, and Midland Bus Services of Airdrie. Over the next few years several other major companies were acquired, including some which the LMS itself had taken over. These came to form four of the major Scottish Bus Group companies, which remained virtually unchanged until 1985 - SMT (later "Eastern Scottish"), Walter Alexander & Sons, Central SMT and Western SMT. Like their English counterparts, these constituent companies of SMT enjoyed great growth in the 1930s, often by purchasing smaller independent firms. Walter Alexander & Sons Ltd, for example, took over at least 14 operators between 1930 and 1938.

The final group of operators to emerge in the 1920s were the independents, or "pirates" as they were sometimes known. Numerically these formed the largest group, but carried a small proportion of passengers. Most firms had fewer than five vehicles (many having just one), although there were some with larger fleets. These were the new pioneers - men with an entrepreneurial flair, some capital and a bus, who went to seek out profitable markets. Not only did these firms compete with the large associated companies (often being bankrupted or bought-out as a result), but they also opened up and expanded contract, private hire and excursion work, which many of the larger companies tended to ignore. Frequently they brought services to rural areas, in the North and West of Scotland, and the Western Isles, for example. For many of these private operators, the bus was just one interest - it may have been combined with a shop or garage as well.

It was these independent operators who provided the basis for much of the cut-throat competition in the 1920s, earning them the nickname "pirates" from the established operators who saw their livelihoods threatened. This was a period of free market competition - there were few barriers to entry and competition forced down the fares. Many of the smaller firms entering lasted only a short time before they had to amalgamate with others or go bankrupt, but there appeared to be no shortage of new entrants. Dyos and Aldcroft (1974) describe the situation thus:

> Hundreds of small scale operators with little capital and little idea of how to manage a transport undertaking entered the industry soon after the War. Many of them maintained services with broken-down vehicles driven by incompetent drivers; facilities for maintaining the vehicles were often non-existent, the buses being run until they dropped to pieces. (p.364)

The authors refer to these operators cutting fares to secure support, and to the lack of timetables generally in that period, quoting an example from the Motor Transport Year Book for 1921-22 - of the 1,888 operators listed, only 200 published timetables. They continue:

> Many of the small bus companies adopted such doubtful practices as 'chasing', 'hanging back', running only at peak hours or on special occasions, and generally 'creaming' traffic on the road. Such intensive forms of competition were not only wasteful but constituted a menace to public safety. (pp.364-5)

There is some controversy over the extent to which the independents engaged in these practices and as Hibbs (1975) recognises, little evidence other than the anecdotal. He gives a more balanced view, that there were both bad and good independents, some having very high standards of maintenance; and that the "territorial" companies often engaged in rate wars and dangerous driving practices themselves to run the competition off the road. Bagwell (1974) gives the example of how Crosville dealt with competition on their Chester - Ellesmere Port services in 1919: "the senior company designed an exact replica of the rival bus, complete to the same coloured livery, and ran it immediately in front of the offending intruder who was soon obliged to concede defeat" (p.226).

1.3 The 1930 Road Transport Act and its effects

Concern over unrestricted competition (which was increasingly felt to be 'wasteful'), along with the problems of irregularity, unreliability, dangerous driving practices and often a lack of co-ordination of services, led to the formation of the Royal Commission on Transport, 1928-30. Incidentally, the Commission only took evidence from the large vested interests (the municipals, large territorials and the railways). No evidence was taken from either the independents or the public. The problem had become noticeable in London by the early 1920s and the scheme of regulation of public transport there was to become the basis for the rest of the country.

The result of the Commission's work was the Road Traffic Act 1930 which established a structure that was to remain virtually unchanged for 50 years. The Act instituted a fairly rigid form of control over the industry, exercised through sets of Traffic Commissioners. The new system involved three sets of licences, all of which had to be held before a service could be operated. The first was the public service vehicle licence - issued only after inspection by a qualified examiner. Both driver and conductor were also required to be licensed, as a guarantee of their competence, and the driver had to pass a driving test. The third and most important type was the road service licence, giving a company the right to operate a service on a particular route. Applications for these, along with objections, were dealt with by the Traffic Commissioners at public sittings of the Traffic Courts.

The Commissioners were given fairly wide powers over the granting or refusal of road service licences. In considering an application they had to take account of factors such as the suitability of the proposed route and the extent to which it was already served; the extent to which the proposed service was necessary or desirable in the public interest; and the needs of the area as a whole in relation to traffic and co-ordination of all forms of transport, including rail. Once a licence was granted (for three years and not automatically renewable), conditions were attached requiring a reasonable level of fares, the publishing of timetables and fares tables, and that passengers be picked up and set down only at specified places.

In carrying out their duties the Commissioners had no precedent to refer to and no firm guidelines were laid out by the Act, with the idea that each case should be examined on its merits. As Chester (1936) was to observe, they adopted the three principles of priority, protection and public need. Established operators who were providing a satisfactory service were given priority over new applicants, and this applied just as much to the independent firms as it did to the "territorial" companies. Where more than one operator was covering a route the services were allocated on a non-competitive basis. Protection took the form of safeguarding local services from express buses picking-up inside their area. In addition protection was also given to other forms of transport, such as local tramways and railways - for the latter it often took the form of restricting long-distance (and often seasonal) coach travel. Public need, which tended to be emphasised less, was usually interpreted as providing some socially desirable but unremunerative services, at less than cost, to be subsidised by the more profitable routes.

Some of the main effects of the Act on the industry will now be outlined, but it is not proposed to enter the controversy that has arisen over its effectiveness (as discussed by Dyos and Aldcroft (1974) and Hibbs (1975) for example). For the public, safer and more reliable services were offered - there was no need for dangerous driving practices to outwit the competition, and there were general improvements in the design, comfort, cleanliness and maintenance of buses. There were also advantages in the co-ordination of timetables and fare schedules: in the East Midlands Traffic Area, for example, 600 time- and fare-tables were co-ordinated within the first year of licensing. For the industry this was a period of growth, but principally for the larger firms, who continued to divide up the market amongst themselves. This found favour with the Traffic Commissioners, as it helped reduce wasteful competition, and there was little evidence that these larger firms abused their monopoly position or were inefficient. Both the three holding companies and the railways continued to invest heavily in the territorial operations - by the end of the 1920s the holding companies, it is estimated, controlled two-fifths of the buses in the country; and the railways had collectively invested £9m by 1933 (Barker and Savage, p.167).

Bagwell (1974) quotes Hurcomb's figures illustrating the degree of consolidation that was encouraged (though not initiated) by the 1930 Act. Between 1931 and 1937 the number of bus operators fell by a quarter from 6,486 to 4,789 and the percentage of buses owned by operators with over 100 vehicles rose from 47 to 61. The total number of buses in service fell from 52,648 (1930) to 49,372 (1937), although this was accompanied by an increase in seating capacity. Despite the consolidation, by 1937 there were still 1800 operators who owned only one vehicle.

It was mentioned earlier that the consolidation process in Scotland took longer to start - it was not until 1929 that the SMT group was reformed - but it too continued at a rapid pace in the 1930s, as Booth (1978) describes:

> From [the 1920s] chaos came the 1930 Road Traffic Act, and the need to license crews, vehicles and routes forced many busmen off the road. They were eagerly bought up by the reformed SMT group, revitalised with railway capital, and many of Scotland's stage carriage and tour operating companies opted to sell out during the 1930s. (p.96)

The Scottish General Transport Company, for example, was sold by BET to SMT in 1931 and became Western SMT. By the outbreak of the Second World War the latter had acquired (either in total or in part) the operations of at least 17 companies in the area to the south-west of Glasgow.

The 1930s were very much the golden era for the bus industry in Britain - there was a great expansion of both numbers and types of service, and the situation was established which was to remain virtually unchanged for fifty years. As Bagwell (1974) describes, "the pattern of social life was rapidly changing."

> . . . the rapid multiplication of bus services greatly increased the mobility of those who were not car owners . . . the person without private transport was better served by public transport in the 1930s and 1940s than had ever been the case before or was to be the case in the decades which followed. After the Second World War, as the number of privately-owned motor vehicles soared upwards from 2 million in 1945 to 15 million in 1970, tramways practically disappeared, branch railway lines were closed, and many uneconomic bus services were withdrawn. The low income earners and the pensioners were then often less mobile than were those of the previous generation. (p.231)

1.4 Legislation and consolidation, 1949-68

In the years immediately following the end of the Second World War, conditions for the bus industry returned to the levels of the 1930s. Petrol rationing restricted private motoring, there were few other outlets for people to spend money on, and fares remained largely at their 1930 levels. By the 1950s, however, rationing had eased, private car ownership was increasing, and leisure habits were starting to change (for example, the spread of television reduced the demand for travel to cinemas). Increases in fuel tax were passed on to passengers in the form of higher fares, at a time when demand for bus travel was falling. The industry thus started a period of gradual relative decline.

The period since 1945 has seen a number of Transport Acts, which have shaped the industry into its present form. The 1947 Act did not provide for the immediate nationalisation of the industry, but when the railway companies were taken into public ownership in 1948 their shareholdings in bus companies passed to the newly-formed British Transport Commission (BTC). The BTC was given power to negotiate for the remaining shares in the Thomas Tilling and SMT groups, along with some smaller operators (such as the Highland Transport Company), while BET remained independent, albeit with a substantial minority of shares state-owned. The Road Passenger Executive was formed to administer these. There appeared to be little resistance to this gradual take-over by the State, certainly in Scotland, as Booth (1978) describes:

> The strains of World War Two left SMT with a time-worn fleet of buses in 1945 and it was clearly going to be a costly exercise if they were to aspire to the standard of service offered in 1939. The post-war travel boom created extra problems and voluntary nationalisation in 1947 was seen as the solution which was most in the public interest. (p.7)

Further evidence that this was a practical solution was witnessed when the provisions in the 1953 Act, which empowered the BTC to dispose of their acquisitions, were never exercised. Meanwhile, the road licensing system of 1930 continued to regulate the industry, and was found to be satisfactory in doing so by the Thesiger Committee (on the licensing of Road Passenger Services) which reported in 1953.

The SMT group adopted its present title upon nationalisation in 1949 - the Scottish Bus Group - and the SMT Co. itself became Scottish Omnibuses Ltd, later taking the fleet name of "Eastern Scottish". Several important events occurred in the next two decades. Highland Omnibuses was formed in 1952, an amalgam of the Highland Transport Company (acquired by BTC in 1951) and Alexanders' interests in the Inverness area, along with the bus and coach operations of motor dealers Macrae and Dick. From a financial viewpoint this was hardly a sound move: in the late 1950s, when 25% of the total SBG mileage was classed as unremunerative, over 80% of Highland's mileage (rural routes outside Inverness) was in this category (Barker and Savage, 1974). However, acquisitions continued by all the SBG companies in the 1950s and 1960s, Highland being particularly active in this respect, and by 1961 Walter Alexander & Sons Ltd had grown to such a size that its three administrative areas were split into separate companies - Midland, Fife and Northern.

The Transport Act of 1962 brought about a minor change of ownership - the BTC was disbanded and the bus interest of the State came under a new Transport Holding Company (THC). More major changes followed in 1968. The imminence of legislation (following a series of White Papers on transport) and the declining financial situation in the industry led BET to sell its remaining interests to the THC. The Transport Act later that year broke up the THC - in England and Wales its bus companies formed the National Bus Company (NBC); in Scotland the SBG became part of the Scottish Transport Group, along with the recent acquisitions of David MacBrayne Ltd and the Caledonian Steam Packet Company. The shipping interests of the latter two companies were combined to form Caledonian MacBrayne Ltd, the bus operations of David MacBrayne Ltd being merged into existing bus companies (principally Highland Omnibuses) in 1970. Very few new acquisitions were made in the 1970s, with Highland in fact selling-off some of the more remote parts of its operations on islands such as Islay, Harris and Mull.

The declining state of the industry was recognised by the 1968 Act, in providing for certain types of financial assistance. Grants of up to 25% were to be made available for the purchase of new vehicles of standard designs, and suitable for one-man-operation. (In 1971 this grant was increased to 50% of the purchase price.) In addition, the fuel duty rebate was increased; there was a 75% grant for fixed capital investment, in items such as bus stations and depots; and finally a grant was offered to local authorities of up to 50% of the cost of subsidising unprofitable bus (and ferry) services.

The Act also established the first Passenger Transport Authorities, which were to integrate all public transport within certain densely-populated areas. Passenger Transport Executives were established to undertake the day-to-day running of the scheme, to take over and operate the municipal bus fleets, and to co-ordinate services with other operators and British Rail, who would receive payments for operating loss-making routes. The first PTAs were established in the Birmingham, Manchester, Liverpool and Newcastle areas, the last-named also building and operating its own light rail system - the "Metro" - on mainly ex-British Rail lines. Local Government reorganisation in 1972 designated each metropolitan county council as a PTA - as a result the existing four PTAs altered their boundaries and were joined by both West and South Yorkshire. In Scotland Greater Glasgow PTA was established in 1973, and renamed Strathclyde in 1980.

Various other Acts followed in the 1970s, making small changes to the public transport environment. The 1972 Act also gave county councils the duty to co-ordinate bus and rail services to meet local needs, enabling them to subsidise services if necessary. The Local Government Act 1974 allowed councils to include these subsidies in their submissions for rate support grants. The increasing role of local authorities in the co-ordination of local transport was recognised in the Transport Act 1978, which changed slightly the criteria by which the Traffic Commissioners were to use in deciding whether to grant new road licences. They were to have regard to local transport plans and policies, the needs of the area as a whole and of particular communities, and disabled travellers. The Act also facilitated car sharing (on a non-profit basis) and the use of community minibuses using volunteer drivers.

1.5 The industry in recent years (with particular reference to Scotland)

In retrospect, the various Transport Acts between 1949 and 1978 did little to change the underlying structure of the industry. The road licensing system remained as the keystone, providing much security, and the industry continued to evolve slowly.

The ownership structure which persisted until 1986 bore much resemblance to that which evolved in the 1920s, the one exception being that the railways no longer ran regular bus services. The state-owned sector comprised the former holding companies and their constituents. In England and Wales the interests of the Thomas Tilling and BET groups went to form the National Bus Company; in Scotland, SMT became the Scottish Bus Group. Many of the 52 constituent companies of the NBC retained their old company names, dating from the 1920s, such as Crosville, Ribble and Midland Red. Until recently the seven component companies of the SBG were registered under their original names (Scottish Omnibuses, Highland Omnibuses, Western SMT, Central SMT and the three companies of Walter Alexander and Sons), although from the mid-1970s a corporate image for fleetnames was adopted. These took the form of "Central Scottish", "Eastern Scottish", etc., and under the 1985 reorganisation (described later) were adopted as the legal company names. In both the NBC and the SBG control was fairly decentralised to company level: in the Scottish area many of the companies retained attitudes and approaches individual to themselves.

The second group were those in local public ownership. In 1985, 47 local authorities operated their own bus services - the three Scottish ones being Lothian, Tayside and Grampian regional councils. There were also seven Passenger Transport Authorities, covering the six former metropolitan counties in England and Strathclyde Region in Scotland, responsible not only for their own buses but for local rail services as well. London Transport until recently was in this category (coming under the care of the Greater London Council), but from June 1984 it became directly accountable to the Secretary of State for Transport. It was renamed London Regional Transport and its activities split into two divisions - buses and underground.

The final category are the privately-owned firms, ranging in size from those with one or two vehicles, to those with over fifty. There is a high rate of entry to and exit from this sector, especially among the smaller operators, and in recent years numbers have fluctuated quite considerably. From 5,818 in 1976 they fell to 5,421 in 1981, rose to 5,849 in 1983 and dropped again to 5,635 in 1985 (Transport Statistics Great Britain, various years). There are, however, a large number of long-established operators - three Scottish examples are Hutcheson's Coaches (Overtown) Ltd which started in 1913, the A1 co-operative of Ardrossan, formed in 1926 and McGill's Bus Services Ltd (of Barrhead), established in 1933.

The structure of the industry can also be viewed in terms of the types of services offered. There are four types, which again changed little since the Road Traffic Act of 1930. [The legal definitions in fact changed on 6 January 1986.] "Stage carriage" comprises local, stopping bus services, run to a timetable and for which passengers pay separate fares. "Express services" are similar, although there are fewer stops and passengers must travel at least 30 miles. "Excursions and tours" are where passengers travel together to places and back again, and pay the same fares. The final category comprises contract work (regular private services, to and from a factory or school, for example) and private hires (occasional private services, eg. group outings). Table 1.1 below shows that the public operators predominate in the stage carriage and express sectors, while the private operators take most of the excursion, contract and private hire work.

To some extent the figures are a reflection of the nature of work in each category. The public operators (who account for over 75% of both passenger journeys and receipts for stage services) require regular, planned work to make the most efficient use of their large fleets and full-time staff. The private operators, however,

Table 1.1

Passenger journeys and revenue: the percentage accounted for by public and private sectors, by type of service (1984).

Type of Service	Public Operators		Private Operators	
	Journeys	Revenue	Journeys	Revenue
Stage carriage	96.9%	95.5%	3.1%	4.5%
Express	76.5	78.7	23.5	21.3
Excursions and tours	13.3	11.8	86.7	88.2
Contract & Private Hire	15.0	12.2	85.0	87.8
All	89.4%	76.3%	10.6%	23.7%

Source: Compiled from tables 2.30 (p.93) and 2.31 (p.94), Transport Statistics Great Britain (TSGB), 1974-84

are more suited to adapt to the often seasonal, part-time and ad hoc nature of the other sectors - in the smaller firms especially, drivers may be employed part-time and only when needed; in many cases vehicles tend to be older and less able to cope with regular, all-day running. On a more general level the table shows the predominance of the public sector - it accounts for almost 90% of all journeys, and three-quarters of passenger revenue.

A more detailed breakdown of the relative importance of each type of service to the public and private sectors is given in tables 1.2 and 1.3, along with specific figures for the SBG. For the industry as a whole, stage services account for 90% of journeys and 75% of revenue, but for the public sector they account for 98% and 93% respectively. These figures are skewed somewhat by the effect of London Regional Transport, where stage services account for over 99% of both journeys and revenue. (One reason for the disparity between number of journeys and passenger receipts for stage services is that many routes are unremunerative, being supported in part by grants from local authorities, which are not included under 'receipts'). Contract and private hire services come second in importance overall, with over 8% of journeys and almost one-fifth of revenue, but it is this sector which accounts for most of the work for the private operators. Express services and excursions combined take less than 1% of passenger journeys but over 6% of receipts. Excursions and tours are of importance to private operators (almost 4% of journeys and 13% of revenue), although it is mainly the larger ones who undertake this work, such as the Wallace Arnold group. Only some of the SBG companies undertake major programmes of both day and extended tours, Eastern Scottish being established in this respect.

Non-stage carriage work accounts for a greater proportion of business for the SBG than it does for the public sector as a whole. Express services take 0.6% of journeys and 6.2% of revenue, as against 0.2% and 3.1% respectively for the sector in general. The contract and private hire services are also proportionately more important (3.5% of journeys against 1.4% for the sector

Table 1.2

Passenger journeys by bus and coach, 1984 (millions)

	Type of Service								
Category of Operator	Stage		Express		Excursions and Tours		Contract and Private hire		Total
	Journeys	%	Journeys	%	Journeys	%	Journeys	%	Journeys
Public	5,479	98.2	13	0.2	4	0.1	81	1.4	5,577
SBG	299	96.1	2	0.6	-	*	11	3.5	311
Private	171	25.9	4	0.6	26	3.9	459	69.6	659
ALL	5,650	90.6	17	0.3	30	0.5	539	8.6	6,237

Journeys are rounded to the nearest million.
- = less than 1;
* = impossible to calculate.

Source: taken from Table 2.30(c), p.93 TSGB, 1974-84

Table 1.3

Bus and coach: passenger receipts, 1984 (£ million)

	Type of Service								
Category of Operator	Stage		Express		Excursions and Tours		Contract and Private hire		Total
	Receipts	%	Receipts	%	Receipts	%	Receipts	%	Receipts
Public	1,484.6	93.3	49.9	3.1	8.5	0.5	47.8	3.0	1,590.8
SBG	119.9	88.4	8.4	6.2	1.2	0.9	6.2	4.6	135.6
Private	69.5	14.1	13.6	2.7	63.6	12.9	347.1	70.2	493.8
	1,554.1	75.6	63.4	3.0	72.0	3.4	395.0	18.9	2,084.5

Source: Taken from Table 2.31(c), p.94, TSGB, 1974-84 in general) - for example contracts from schools, coal mines and factories account for a significant amount of business in many depots.

The gradual decline in the industry since the 1950s has already been mentioned briefly, and is now discussed in greater detail. Table 1.4 below gives an indication of this decline in both actual and proportional terms. The proportion of journeys by bus peaked at 42% in 1952, fell steadily in the 1950s and 60s, slowed in the 1970s, and levelled off at 8% in the early 1980s. Over this period passenger distance travelled by bus halved. Related to this, and even more dramatic, is the rise in private transport, from 38% to 84% of journeys between 1952 and 1985, with an almost six-fold increase in passenger distance travelled. The numbers of licenced private cars rose from 2.4 million in 1950 to 8.3 million in 1964, and by 1985 stood at nearly 16.5 million. Air has shown a gradual increase over the period whilst rail, although declining in proportional terms from 20% to 7%, fell only slightly in real terms. The oil crisis of the mid-1970s, whilst checking the rise in car transport, also halted the decline in both bus and rail travel, causing both to rise slightly. The early 1980s have seen a period of consolidation; car travel has increased in real terms but by little in proportional terms; and bus and rail are fairly static. The patterns described above are set against a background of a two and a half-fold increase in the total distance travelled.

Table 1.4

U.K. Passenger Transport by Mode, 1952-85.

	Bus		Private*		Rail		Air		Total
	PK	%	PK	%	PK	%	PK	%	PK
1952	81	42	74	38	39	20	0.2	0.1	194
1955	80	38	93	44	38	18	0.3	0.1	211
1960	69	28	138	55	40	16	0.8	0.3	248
1965	59	19	211	69	35	11	1.7	0.6	307
1970	53	15	271	75	36	10	2.0	0.6	362
1975	55	14	302	77	35	9	2.0	0.5	394
1980	45	10	375	82	35	7	3.0	0.6	458
1981	42	9	384	82	34	7	3.0	0.6	463
1982	41	8	398	85	31	6	3.0	0.6	473
1983	42	8	406	84	34	7	3.0	0.6	485
1984	42	8	422	84	35	7	3.0	0.6	502
1985	42	8	437	84	36	7	4.0	0.7	519

In 1982 ASLEF organised a major programme of industrial action.

Figures are expressed in billion passenger kilometres (PK) and as a percentage (%) of the total.

* Private transport includes cars, taxis, motor and pedal cycles.

Source: TSGB, 1974-84, Tables 1.1 (p.18) and 7.1 (p.180)

An analysis of the situation over the period 1975-85 shows that the decline has not been uniform across the industry; rather, the public sector has been affected more than the private sector. Table 1.5 below shows both the total passenger journeys and passenger receipts.

In terms of passenger journeys, the public sector as a whole has declined by around the average rate for the industry, but this masks important differences. The SBG, for example, only suffered an 18% fall in journeys, while the NBC experienced a 32% decrease (from 2,113

Table 1.5

Passenger Journeys (Millions)

	1975	1985	% change 1975-85
All public	7,452	5,564	-25.3
SBG	392	320	-18.3
All private	716	605	-15.5
All operators	8,168	6,169	-24.5

Passenger Receipts (£ million)

	1975 Actual	1975 Adjusted*	1985 Actual	% change 1975-85 (real prices)
All public	701.5	1,943.8	1,683.6	-13.4
SBG	59.7	165.4	139.8	-15.5
All private	157.1	435.3	526.8	21.0
All operators	858.6	2,379.2	2,210.4	- 7.1

* Adjusted to 1985 values using GDP deflator
Source: TSGB 1975-85, tables 2.29 (p96) and 2.30 (p.97).

million to 1,453m). The fall for private operators has been less than the industry average, and their share of passenger journeys has risen from 8.8% to 9.8% of the total. These percentages are somewhat misleading, as passenger journeys for most classes of operator have fluctuated in the 1980s: for the SBG, for example, they fell to 314m in 1982, rose to 319m in 1983, fell again in 1984 to 311m with the miners' strike, rising again to 320m in 1985.

The figures for passenger receipts show an interesting disparity between the two sectors. Public operators' receipts fell, whilst those of the private sector increased. A possible reason for this could be the expansion of express coach services following the 1980 Transport Act (see later), which private operators were quick to take advantage of. Their share of receipts has increased from 18.3% to 23.8% of the total for the industry. It is interesting to note that the SBG has suffered a greater decline than for the public sector as a whole.

The number of vehicles in stock in the industry has also fallen, with the greatest reduction being in the past decade, as the table below shows. There has been an overall decline of about 10%, but the reduction in the public sector of 25% has to some extent been compensated for by an increase of over 20% in the private sector. For the SBG there has been a steady annual decline in the last ten years, although in 1985 the number of vehicles did rise slightly. [It is possible that this rise may have continued, with the advent of mini-bus services in 1986 causing many SBG companies to purchase often substantial numbers of such vehicles.]

This pattern has been reflected by a similar reduction in the numbers employed in the industry. Table 1.7 shows that, since 1968 (the first year for which such statistics are available) overall employment has fallen

Table 1.6

Vehicle Stock, 1965-85

	1965	1975	1985	% change 1965-85
All public	50,680	48,800	37,600	-25.8%
SBG	4,680	4,300	3,400	-27.3%
Private	24,800	28,100	30,300	+22.2%
All operators*	75,480	76,900	67,900	-10%

* Figures may not add up exactly due to rounding
Source: Compiled from TSGB 1964-74 table 45 (p.91) & TSGB 1975-85, table 2.32 (p99).

by over 30%. A loss of 40% in the public sector, however, is partially compensated for by a similar rise in the private sector.

Table 1.7

Staff Employed, by Type of Operator

	1968	1975	1985	% change 1968-85
Public	224,779	190,399	134,096	-40.3%
Private	28,455	34,031	40,206	+41.3%
All	253,234	224,410	174,302	-31.2
British Rail	266,000	229,800	168,100	-36.8%

Source: Compiled from TSGB 1968-78 table 68 (p.86) and TSGB 1975-85 table 2.34 (p.101)

This accounts for a decrease in the proportion employed by the publicly-owned companies, from 88% of total employment in 1968 to 77% by 1985. By way of comparison, the figures for British Rail are also given - here the fall since 1968 is even greater (36.8%). A fuller discussion of the changes in employment is given in the next chapter.

It is worth commenting here that the SBG appears to be fairly efficient when compared against other operators in the public sector. As the next chapter will show, the SBG has reduced its staff at a greater rate than for the industry as a whole. Several more comparisons are presented here. The figures are broken down into the operator categories which the Department of Transport uses in its annual publication, Transport Statistics Great Britain. Two measures are shown below in table 1.8, comparing 1975 and 1985.

The first part of the table shows the vehicle kilometres per vehicle, ie, the average distance each operator's vehicles travel in a year. It should be emphasised, however, that these are very much average figures for the fleet as a whole, and that the range of distances travelled by vehicles in a fleet varies considerably. In the SBG for example, a coach used on "Citylink" express services to London may travel well in excess of 150,000 km per year, whereas a bus used on a few local routes in the Highlands may journey than 20,000 km. In the table the SBG ranks second (behind the NBC), has shown an increase of over 10% since 1975. Next in the

Table 1.8

Efficiency indices (a) Vehicle kilometres per vehicle (1)

	1975	1985	% change 1975-85
L.T.	44,531	50,000	+12.3
PTEs	48,174	56,626	+17.5
Municipals	42,097	44,615	+ 5.9
NBC	58,382	66,599	+14.1
SBG	55,814	61,765	+10.6
Private	36,263	37,855	+ 4.4
All	46,164	48,836	+ 5.8

(b) Staff employed per vehicle (2)

	1975	1985	% change 1975-85
L.T.	5.44	4.94	- 9.2
PTEs	4.10	3.96	- 3.4
Municipals	3.49	3.10	-11.1
NBC	3.53	3.20	- 9.3
SBG	3.39	2.70	-20.3
Private	1.21	1.33	+ 9.9
All	2.92	2.57	-11.9

Notes (1) Calculated by dividing, for each operator, the total vehicle kilometres by the size of fleet.

(2) Calculated by dividing, for each operator, the number of employees by the size of fleet.

Source: TSGB 1975-85, tables 2-32, 2-33, 2-34; pp. 99-101 league are passenger transport executives, followed by London Transport with the municipals well down. A possible reason for the well above-average distances for both the NBC and the SBG is that many of their routes are either rural or inter-urban. In addition both run an extensive long-distance express service network, and participate in the coach tours market. At the other end of the scale, the municipal operators mostly run services in urban areas (with occasional express services and tours), and the private sector operate a very different mixture of service types, as was discussed earlier.

The number of employees per vehicle is given in the other part of the table, again comparing 1975 (when the move to one-man-operation was starting in earnest) with 1985 (when it had been substantially completed). All public operators reduced their staff-vehicle ratio over this period: the SBG had both the lowest ratio in each year and the greatest proportional reduction. London Transport is at the other end of the scale, with almost five staff for every vehicle - not unexpected owing to the large number of conductors employed. The private sector's figures are much lower than for the public sector: in a sizeable proportion of firms there may be little in the way of engineering or clerical staff; similarly many employees may be part-time or be engaged in both driving and maintenance, and in the smaller firms it is quite common for the owner to do much of the driving himself.

Another indicator of the relative efficiency of the SBG compared to the rest of the public sector is given in table 1.9, below. It shows the number of passenger journeys per employee, and there are interesting differences between 1975 and 1985. In the earlier year the municipals and PTEs carried the greatest number of passengers per employee, with the SBG taking the least for the public sector. It has already been mentioned that, between the two years, both the number of passenger journeys and the number of staff employed fell. By the latter year, most public operators had improved their ratio of passenger journeys per employee, with the 30% increase by the SBG being by far the greatest. This would be in part, at least, a result of the major efficiency exercise which was carried out by the Group in the early 1980s, and which is described later in this chapter. The private sector shows a marked decrease over this period: for them it was a period when passenger journeys fell but staff numbers increased.

Table 1.9

Passenger Journeys per Employee*

	1975	1985	% change 1975-85
London Transport	41,810	44,864	+ 7.3
PTEs	49,004	51,083	+ 4.2
Municipals	54,629	49,627	- 9.1
NBC	29,306	30,849	+ 5.2
SBG	26,849	34,782	+29.5
Private	21,058	15,049	-28.5
All operators	36,399	35,393	- 2.8

*Calculated by dividing, for each operator, passenger journeys by total staff employed.

The decline in demand for bus travel has, for operators, caused a steady increase in the number of uneconomic routes, not just in rural areas but in towns as well. The 1960s and 70s were also a period of ever-increasing costs (in particular of labour and fuel), despite productivity improvements such as the introduction of one man operation ("OMO"). In this situation, one or more of a number of solutions were adopted by companies. These were discussed by Maultby (1982) and included cross-subsidisation, using revenue from profitable routes to subsidise unprofitable ones; improving productivity of vehicles, staff and capital; reducing service frequency and increasing fares above the general level of inflation (both of which can drive even more passengers to alternative forms of transport); and seeking subsidies from local authorities towards the costs of maintaining unremunerative services, on the grounds of "social need".

Despite productivity improvements in recent years, financial support from local and central government has increased almost three-fold in recent years, as can be seen by table 1.10 below. This shows the principal subsidies to the road passenger transport industry for four selected years, both in actual and real (adjusted to 1985 prices) terms, with the figures for British Rail again shown for comparison.

Table 1.10

Public expenditure on subsidies and grants to inland surface transport, 1975-85 (£ million).

	1975 Actual	1975 Adj.	1978 Actual	1978 Adj.	1982 Actual	1982 Adj.	1985 Actual
Road passenger transport:							
Fuel duty rebate	38	105	59	113	93	108	148
New bus grant	31	86	52	99	40	46	0
Concessionary fares (1)	79	219	124	237	230	267	288
Revenue support	185	513	165	315	490	568	498
Other	10	28	15	29	39	45	39
Total (road pass.)	343	950	415	792	892	1,034	973
% of total exp.	36.9		38.6		43.3		44.2
British Rail(total)	514	1,424	571	1,089	987	1,144	1,001
% of total exp.	55.3		53.1		47.9		45.5
All grants (2)	929	2,574	1,076	2,053	2,060	2,388	2,200

Source: TSGB 1975-85, table 1-16, p.25

Notes

(1) Subsidy to the passenger, not to the transport operator
(2) Includes subsidies and grants to other bodies such as London Underground, National Freight Corporation and British Waterways Board.

Actual = Actual cost, £m
Adj. = Adjusted to 1985 prices (£m), using GDP deflator

In real terms (with figures adjusted to 1985 prices) the picture appears to be more one of fluctuation rather than of steady increase. Certain items have increased, such as the fuel duty rebate and the cost of concessionary fares, but revenue support has varied and is now lower in real terms than it was in 1975. The new bus grant (designed to assist operators in purchasing new vehicles for local services) was progressively phased-out in the early 1980s. It peaked at £73.6m in 1980/81, £5.8m of which was received by the SBG. However the overall level of subsidy to the industry remains high, at nearly £1,000m in 1985. In addition, the bus industry in 1985 received a greater proportion of the total subsidy than it did ten years previously. Whereas in 1975 bus was almost twenty percentage points behind rail, ten years later they received almost equal levels of subsidy.

Concern over subsidies in particular, and with the state of the industry in general, shaped the present Government's policies for this industry. Their feelings were well summed-up by the following quotation from the 1984 White Paper Buses,

> There has been too little incentive to develop markets, to woo the customer. Operators have been hampered by a philosophy that is defensive and inward-looking. (p.1)

1.6 Deregulation

The present decade has brought the first major changes to the operating environment of the bus industry since 1930. The Conservative Government, since 1979, has been dedicated to encouraging free market competition, growth and efficiency by removing regulation and restriction.

The Transport Acts of 1980 and 1985 reflected these aims, for combined they repealed almost entirely the road licensing provisions of the 1930 Act. Savage (1985) discussed some of the Government's reasons behind these measures. It was felt that regulation had discouraged innovation, especially in rural areas where small private operators might be able to cater more effectively than a large company. (The 1978 Act had recognised this to some extent in its measures on community mini-buses and car-sharing.) It was considered also that the principle of "priority" meant that inefficient companies could not be challenged, since they were the established operator on their routes. A protected bus market could hence lead to a protected labour market where inefficiencies such as restrictive practices could emerge. Finally, it was believed that cross-subsidy caused a misallocation of resources, and unfairly penalised those living in urban areas in order to subsidise those living in rural areas.

The main feature of the 1980 Act was the abolition of licensing for express services (including excursions and tours) of over 30 miles. This resulted in a great increase in express coach services - new routes, more frequent services, lower fares and improved vehicles - provided not just by the established operators (in most cases the NBC and SBG) but also by independent firms eager to take advantage of the new competitive opportunities. It was these independents, some of which were new to the industry, that led the field initially.

Stagecoach (of Perth) and Newton's Travel of Dingwall were two of the most prominent in this respect in Scotland, with luxury coaches, attractive timetables and fares well below those of the SBG companies (and British Rail). In time the SBG started to retaliate, cutting fares at first and in 1983 forming "Citylink", the banner under which all the express services are run. The Group invested fairly heavily in new vehicles (of a higher standard than previously) painted in a bright new livery (common across all companies) and continued to improve and extend its services.

The response of the SBG, whilst slow at first, regained for it a prominent place in the express coach market (and now provides serious competition for British Rail). The NBC refurbished their "National Express" image and now enjoy similar success, with a number of Anglo-Scottish routes being operated in conjunction with the SBG. The independents were successful at first (and provided much of the incentive for change to the SBG) but have been less so latterly, especially in Scotland.

The 1980 Act also contained several other provisions. It became easier in theory to obtain a licence for a stage carriage service in competition with an established operator. There were a small number of attempts by private operators to do this over profitable routes but in practice, as the Department of Transport reported in 1985, only some were successful, others being refused by the Traffic Commissioners on public interest grounds. Further provisions included the replacement of vehicle licensing with operator licensing, ending the requirement to licence conductors, the phasing-out of the new bus grant, and the establishment of "trial areas", free from all quantity licensing restrictions. The best known of these was around Hereford (the others were in parts of Devon and Norfolk).

Dunbar (1984) points out that the predominantly rural county of Hereford and Worcester was hardly typical of the country as a whole. The local NBC subsidiary (Midland Red West) did not have a local "monopoly" over bus services - there were a number of established independent operators - and there were also very few profitable routes. The deregulation trial brought an increase in service on these routes (at times, on one such route, three operators vied with each other for passengers) and a reduction in service on many other routes. A number of new operators entered the market, some achieving moderate success, and others having their operators' licences removed on account of the unroadworthiness of their vehicles. Writing almost three years after the experiment began, Dunbar feels that the administration of the scheme had a "straightjacket" effect on operators: they had to give 42 days' notice if they wished to start a new service and 56 days' notice if they wished to withdraw one (even if it was losing money heavily).

He concludes

> Operationally the experiment has been a complete failure, in that no permanent improvement in services has been engendered and a well-organised network has been disrupted.
> (p.446)

Many expressed fears that full-scale deregulation (see later) will have similar effects.

The desire of the Conservative Government to set financial targets for, and generally improve the efficiency of nationalised industries, along with the pressures for a more freely competitive operating environment, caused the SBG to undertake a major efficiency exercise in the early 1980s. It was modelled on a similar exercise carried out by the National Bus Company in the late 1970s. Entitled "Scotmap" (Scottish Bus Group Market Analysis Programme), it involved on-bus passenger demand surveys (to find out when, where and why passengers travelled) and bus journey time analysis (to measure reliability and discover where and when buses are delayed). Large numbers of questionnaires were distributed, both on and off buses, with home visits also being used to find out views on fares, service frequencies, facilities at bus stations, etc. In many depots the result was a more efficient scheduling of drivers' duties and vehicle allocations, reducing non-driving time, and in some cases redundancies occurred.

"Scotmap" was the first major event to occur in the SBG in the 1980s. The second was the reorganisation of the Group in response to the total deregulation of services as set out in the 1984 White Paper Buses and as enacted by the Transport Act 1985. The Government was encouraged by the success of the first round of deregulation: the White Paper quoted a report by the Transport and Road Research Laboratory which suggested that, between 1980 and 1983, fares on express services fell by an average of 40% in real terms, while over 700 new services were introduced. The paper also states,

> The last four years have shown that the industry has able and energetic managers who are ready to take advantage of new opportunities and that there is life in the bus market where operators have been prepared to try out new ventures. It is now time to go further. (p.1)

The 1985 Act abolished road service licensing for local services outside London from 26 October 1986. It established two categories of stage services: those which operators register to run without public subsidy, (and therefore at a profit); and those which are not registered (and are therefore unprofitable) but which the local authority wishes to see provided on grounds of social need. These are put out to tender - the company offering the lowest price receives the subsidy. (This replaces the revenue support grant.) Cross-subsidisation was therefore forbidden. Municipal authorities and PTAs running their own bus services now had to do so through separate limited companies. Other provisions included an easing of restrictions on taxis, and the requirement of the NBC to prepare itself for privatisation within three years. This has now taken place, with the constituent companies being sold off as individual entities. In early 1988 the intention to privatise the SBG was announced.

The 1985 Annual Report of the Scottish Transport Group explained the rationale behind the reorganisation that took place in June 1985:

> A massive challenge has been issued to the bus industry and in anticipation of this the Group . . . reorganised its bus subsidiaries into smaller units, geographically more compact, more closely aligned to market sectors, and with a clearer definition of management skills and responsibilities. (p.9)

This marked the end of the seven, all-purpose companies which had evolved from the formation of the SMT group in 1929 and which had changed little since the 1950s. They were replaced by eleven smaller and predominantly stage carriage companies, which (like their predecessors) operate within geographical areas. This was accompanied by some devolution of authority to local level, with the creation of an area manager for each depot, in charge of both maintenance and traffic. The express services and extended tour market is now handled by "Scottish Citylink Coaches Limited", which "buys-in" drivers and vehicles from the operating companies. Finally, the central workshops of six of the old companies were formed into "SBG Engineering". As well as undertaking heavy engineering work for the SBG companies they are now permitted and encouraged to take business from outwith the Group.

1.7 Summary

This chapter has outlined some of the main features in the development of the road passenger transport industry in Britain, with some emphasis being given to the Scottish situation. Two main themes which can be identified are those of security and slow evolution. The former was afforded by the licensing provisions of the Road Traffic Act 1930. Slow evolution, as opposed to rapid change, is a suitable description of the development of the Scottish Bus Group from its origins in the reformed SMT Company of 1929. This stable and secure climate failed to stem a gradual decline in bus patronage, however, which started in the 1950s and only now is showing signs of levelling out. Concern over this, and over the costs of maintaining increasingly unremunerative services in particular, led the Government to introduce the most radical legislation the industry has seen since 1930. This, therefore, is the context in which the research has taken place. The industry is now being forced to change gear to cope with the demands and rigours of free competition again. The effects of the above features of the industry on the workforce (and in particular the drivers) are discussed in the next chapter, along with an analysis of the job of the bus driver in the Scottish Bus Group.

CHAPTER TWO

SOME ASPECTS OF THE LABOUR ENVIRONMENT

2.1 Introduction

The bus industry, by its very nature, is labour-intensive. It relies very heavily on its employees, being a service industry, and any "lost production" (in the sense of a bus failing to run, due to staff or vehicle shortage, or traffic congestion) not only is immediately apparent to the customer, but also cannot be recovered. Labour costs account for around 60% of total expenditure, despite reductions in recent years. The bus driver, therefore, plays a crucial role in his company.

The previous chapter provided the background to the research in terms of the industry's history and development, and present structure. This chapter looks at the background from the labour viewpoint. There is a brief discussion of some of the main historical features of the labour environment, followed by a more detailed examination of the driver's job and the conditions in which it is undertaken. This will be tailored specifically to drivers in the Scottish Bus Group, although there are many features which apply across the industry. At this stage it should be said that there appears to be very little literature on this topic - much of what is written comes from Thomson and Hunter's (1973) chapter on the road transport industry, studies of London and Dublin busmen in the 1960s (Foster and Gardner, 1966; Van Beinum, 1966), postgraduate theses by Johnston (1981) and Malins (1973) examining this aspect of the industry, the reports of various Government bodies and of the Scottish Transport Group, and finally personal observation and informal interviews with management and staff in various bus companies.

2.2 Some historical aspects

Johnston's thesis, which examines the bus driver's job from a sociological "labour process" aspect, provides some evidence of the harsh conditions for labour in the early part of the industry's existence. In times of hectic competitive activity (especially in London) conductors had to use every ploy to fill their buses with, often hesitant, passengers, and drivers had to race from stop to stop to keep up to time. Working conditions appeared to be harsh - staff were exposed to all weathers on open horse and early motor buses, hours were long (often 16 hours a day, seven days a week) and wages were low. There was little security of employment, and dismissal could occur for the slightest offence or complaint. The latter years of the nineteenth century, in particular, were ones of general unemployment and recession, offering little scope for organised protest or reaction.

The situation started to improve towards the end of the last century as trade union membership grew, first among tramway workers and then busmen, and conditions of work became more favourable. Wages rose and hours were reduced to around eight or nine per day, although often organised in two parts with a "spreadover" in-between. Conditions fluctuated in the inter-war period, especially in the often intense competition which took place in the years preceding the 1930 Road Traffic Act, but in the 1930s there was a general improvement in wages, busmen becoming relatively well paid in comparison to other semi-skilled occupations. Trade union membership continued to grow, it being in this period that the major negotiating machinery was established. In the municipal sector a National Joint Industrial Council was established in 1919 for tramway workers and was subsequently extended to include bus employees. The Transport and General Workers' Union has had bargaining arrangements with London Transport since the latter's inception in 1933. The Tilling and British Electric Traction groups were for a long time opposed to unionisation, and it was not until 1940 that the National Council for the Omnibus Industry was established.

Malins (1973) feels that the growth in trade union membership may have been encouraged by the 1930 Act, as the Traffic Commissioners had to be satisfied that an operator paid "fair wages" before he was granted a licence. The spate of takeover activity in the 1930s (of small operators by large firms) may have given additional impetus to this: bus workers who found themselves with more remote management and more formalised systems may have turned to trade unions for security and protection.

The labour environment worsened in the post-war years. This was due less to the nationalisation of much of the "company" sector (the Tilling and SMT groups), but more to the changing patterns of transport usage and the general economic conditions. In the last chapter it was noted that, after rising to a peak in 1952, the number of passenger journeys made by bus (and the proportion of total journeys) fell for nearly 30 years. Fares had to be increased by amounts above the general level of price inflation to counter ever rising fuel, materials and labour costs. The 1950s and 1960s were decades of relative prosperity for the UK, which brought with them low levels of unemployment. A period of falling demand was accompanied by labour shortage, as the job of a bus driver became increasingly unattractive. This was due to features which included six-day weeks, split shifts (eg. half a shift in the morning peak and half in the late afternoon peak) and perhaps even twelve hour working on a Saturday.

These problems occurred at a time when car ownership (and traffic congestion) were increasing, and pay was falling behind those working in comparable occupations. Heavy overtime working became a necessity if drivers wanted a "reasonable" level of take-home pay (often 15-20 hours on top of a 40 hour basic week), and staff shortages in many depots ensured that it was often available. A survey by the National Board for Prices and Incomes (NBPI) (1967) conducted in the mid-1960s found that the average working week for busmen in the "company" sector was 52.7 hours, as against the average for all industries of 46.1 hours. By working these extra hours their earnings matched the average for all industries. In some depots the trade unions imposed a restriction on recruitment: by keeping the number of drivers below the optimum level, they ensured there were adequate opportunities for overtime. This was often condoned by management (at least at lower levels) as a way of retaining staff.

Shortages of staff tended to be worse in larger urban areas, where there existed plentiful opportunities in other occupations. A survey of the state-owned sector in 1966 found that 100 out of 545 depots had a shortfall of drivers of over 15% (NBPI, 1966). As a result the industry attracted "drifters" - both people who moved frequently between jobs, either through lack of interest or by being dismissed, and skilled craftsmen, temporarily out of work, who would take up bus driving as a short-term measure until employment conditions in their own trade recovered. Similarly, a shortage of "traditional material" for drivers and conductors resulted in increasing numbers of women and immigrants being employed. As a consequence, the "image" of the job declined, as the following quotation from Richman (1969) illustrates:

> Generally the public hold busmen in low esteem. Many people have a "riff-raff" image of them, which can be partly attributed to the early post-war years when the labour shortage forced companies to abandon selectivity in recruiting. The job then became almost casual labour.
> (p.243)

Problems of recruitment and retention of staff have always been fewer in the less urban, more rural areas, where there are fewer alternative sources of employment, and where bus driving tends to have a higher status in the local community.

Foster and Gardner (1966) investigated the labour problem in London Transport in the mid-1960s. Amongst the central London garages there was an average shortfall of drivers of around 12% in this period, and annual turnover fluctuated between 15 and 20% (it being 15.8% in 1962, 19.8% in 1963 and 16.0% in 1965). The researchers carried out interviews and discussions with three categories of people - potential recruits (men with an interest in driving), existing bus drivers and former bus drivers - and found that the job suffered from an image problem. This was particularly so among potential recruits: 87% of the statements they made about the job were negative. When asked to compare the job of driving a London bus with seven other driving jobs (such as touring coaches and delivery vans) they placed it last. It is interesting to compare this with the group of former drivers - they ranked the job equal first along with driving petrol tankers and London taxis. The main disadvantages as perceived by the potential drivers included the monotonous nature of the work (stopping and starting all the time), shift working (irregular hours and weekend work), the difficulty of keeping to schedule, the severity of discipline and the poor public image of the job. The nature of the work and the shifts were mentioned by the ex-drivers, along with the low pay and the detrimental effects of the job on health (such as strain, fatigue and ulcers).

Interviews carried out with serving drivers and trainees on a less formal basis found that general morale tended to be fairly low. In addition to the low level of pay and the disruptive effect of shift working on one's social life, the driving situation was felt to be a major disadvantage of the job. In particular there were the problems of increased congestion, people parking too near to bus stops (making it difficult to pull in and out) and the general lack of consideration shown by other road users towards bus drivers. Management was also criticised for being too distant and impersonal, with the comment being made that it was demeaning to have to sign a statement admitting one's faults.

It would appear that little has changed in the twenty years since this report, especially in London Transport. The number of drivers employed has continued to fall, but there is still a shortfall of drivers, with London Regional Transport announcing early in 1987 that it would have to recruit over 600 to maintain staffing levels (<u>The Times</u>, 1.1.87). The driving situation has continued to worsen throughout the country, with the only major change being the increase in unemployment since the late 1970s which has helped to reduce turnover. The fall in the numbers employed in the industry is illustrated in the following table.

<u>Table 2.1</u>

Staff Employed, by Type of Employment

	1966	1970	1975	1980	1985	% change 1966-85
Drivers	99,128	98,168	102,679	96,386	)	
					)105,368*	-41%
Conductors	79,709	59,319	34,014	16,710	)	
Other	87,667	87,909	87,717	87,931	68,933	-21%
All staff	266,504	245,396	224,410	201,027	174,302	-33%

Source: <u>TSGB 1966-76</u> (table 63,p.89) and <u>TSGB 1975-85</u> (table 2.34, p.101)

* The figures for drivers and conductors in 1985 were not disaggregated: the figures for 1984 were 92,107 drivers (a fall of 8% since 1966) and 8,995 conductors (a fall of 90% over the same period).

The move towards one-man-operation (OMO) of buses from the late 1960s is illustrated graphically in this table, which shows the changes in numbers employed by type of job in the bus industry. Between 1966 and 1984 employment fell by a third overall, by 8% for both drivers and other staff, but by almost 90% for conductors. This has been most marked in the municipal and NBC/SBG sectors, especially in Scotland where neither Strathclyde PTE nor the three municipal operators now employ conductors. The fall is least in London; in 1984 6,184 conductors were employed by London Transport as against 7,960 ten years previously. In 1974, LT employed 20% of conductors, now they employ almost 70%.

The late 1960s were perhaps one of the worst periods the bus companies have had to face. They were under pressure from at least three directions - economic, labour and Government. The economic problems have already been discussed at some length - those of declining demand and productivity, combined with increasing costs. There were also pressures from the labour side - the decreasing attractiveness of the conditions of work (along with a low level of unemployment) did little to ease the shortage of staff. In addition, restrictive practices in the use of labour became more entrenched in this period. The report of the National Board for Prices and Incomes in 1966 listed a large number which employers had reported to them. These included those concerned with duty scheduling (such as use of the slowest running times as the norm for a route, and excessive times for clocking on and off, and for resting at a terminus); restricting flexibility of labour (preventing interchange of duties between drivers and conductors, not permitting drivers to spend part of their shift on cleaning or maintenance work, and resistance to the use of part-time labour) and strong opposition to (and restrictions on) the use of one-man-operation (OMO). Increased dissatisfaction, both with pay claims and with conditions of employment generally, led the TGWU to issue its "Busmen's Charter" in 1967. This advocated not only a large increase in basic rates of pay, but also improved conditions such as longer holidays, a larger share of savings from OMO and full pay for rest periods within a "spreadover" duty. (Eventually many of these were achieved through negotiation.)

The slowness in improving rates of pay was to some extent caused by the third pressure on the industry - the government. The Wilson administration of the late 1960s desired to restrict wage increases to those cases where they were directly linked to improvements in productivity. The National Board for Prices and Incomes (NBPI) produced two major reports on the industry: Pay and Conditions of Busmen, in 1966, and Productivity Agreements in the Bus Industry the following year. Both discussed the problems which the industry faced at that time, and recommended the increased use of OMO as a means of reducing costs and improving productivity. The Board found that the UK compared unfavourably with Europe: in this country one-man-operation was only being used on lightly-used country routes and in a few towns (such as Reading and Manchester); on the continent it was much more widely spread, with major cities such as Stockholm having had all its buses driver-only since 1960.

Thomson and Hunter (1973) considered that the reluctance to introduce OMO was to the industry's detriment in the 1960s:

> It may in fact be one of the most pertinent criticisms of the British industry that its introduction was so long delayed. At all events in the late 1960s it emerged as the obvious way of solving the labour shortage, cutting costs and yet increasing the individual's pay.(p.305)

The NBPI felt that, although the benefits of OMO were cost savings of around 15-20%, there were costs in terms of slower average speeds, increased capital costs (new vehicles and ticket machines suitable for OMO) and higher pay for drivers.

The Government used these reports in an attempt to freeze a pay increase that had been negotiated by the NJIC in late 1967, as it was not linked to productivity improvements. A series of moves by both parties took place (including a strike in Dundee and the threat of a national stoppage), until at the end of 1968 the "freeze" powers expired, the busmen obtained their pay increase (backdated to the original award) and there were no productivity concessions. In addition, the NBPI had produced nine reports on this one industry within three years. [As well as the two major reports already mentioned, there were seven others. One dealt with the pay of municipal busmen, another with maintenance workers in bus companies, and the rest with busmen in specific areas, such as Rochdale, Dundee and Wigan.] This period of poor industrial relations was improved little by the restrictions on drivers' hours contained in the 1966 Transport Act. These were introduced through a concern for public safety, but the labour shortage meant that companies could be less flexible with their existing staff, and had more difficulty in recruiting and retaining employees as the permitted amount of overtime was reduced. Protests from the industry brought temporary concessions, but revised restrictions on working and driving hours, and rest days, were introduced later.

It is perhaps appropriate to end this section on industrial relations, with a few words on management. Several of the studies in this area draw attention to the poor quality of management felt to exist in many areas, especially in the late 1960s. The NBPI were critical of operating efficiency, and the extent to which restrictive practices had become established (particularly with regard to the amount of paid non-driving time). They comment,

> Some such practices, especially where agreement to them is tacit rather than formal, will have been the product of insufficiently firm management, and, though we recognise that local resistance to change in this industry has often been strong, we note with regret that little progress has been achieved [towards local bargaining] for higher rewards in return for changed practices involving more effective use of manpower. (NBPI, 1967, p.22)

Malins (1973) studied the problem from the historical aspect, saying that many managers have made the industry their career - they have a specialised knowledge (especially in the traffic and engineering sides) with skills that cannot easily be transferred elsewhere. He felt that this long-term commitment of many managers to the bus industry (and the relative infrequency of movement between companies) fostered both a paternalistic attitude and a lack of innovation. Writing in the early 1970s Malins considered that this environment of inactivity manifested itself not only in a dearth of ideas for new routes and fares structures, but also in the management structure itself. He drew attention to the comparative lack of money spent on training (especially prior to the Industrial Training Act), market research and publicity; the rarity of personnel departments (in such a labour-intensive industry); and problems with alienation of supervisors (inspectors), the quality of which fell as drivers' earnings increased with overtime and OMO bonuses. Drivers became more reluctant to be promoted as the earnings differential between them and their supervisors narrowed; indeed, some drivers were able to earn more than inspectors.

Johnston (1981), who based his study on the Scottish Bus Group in the late 1970s, went further in his criticism of management. He considered that their "sleeper" attitude (as opposed to a "thruster" approach) led to a reluctance to deal positively with the industry's problems: they were unwilling, for example, to alter timings or co-operate with local authorities on routes which had become heavily congested in recent years. This had adverse consequences for the crews: not only did they have to face angry passengers whose buses were delayed and behind schedule, but also there was a preference for cutting back services and imposing redundancies, instead of marketing services more strongly. He also drew attention to the poor facitities for passengers at bus stations, and the use of old vehicles which not only were difficult to drive but broke down frequently, with the passengers venting their wrath on the unfortunate crew. Johnston, who had worked both as a conductor and as a driver for several SBG companies in the 1970s, summed up his feelings thus,

> The effects of the failure of bus managements to tackle the underlying problems, and the effects these have on the crews, is perhaps best evidenced by the unwillingness of crews to stay in the job. Again it is the rural areas where problems are lesser that have the more stable workforce, while the effects of urban working take place in a more open labour market, more open to alternatives. (p.77)

The 1970s saw a general improvement in industrial relations with the increase in the levels of unemployment gradually reducing labour turnover and making it easier to recruit. The 1980s, with removal of licensing restrictions first on express services and later on virtually all services, have served to sharpen-up management's attitudes in the way Johnston desired. There have been very few widespread stoppages in recent years, although local strikes over local issues do take place from time to time. A lack of general material on the present labour environment prevents further analysis on a national scale; instead, the discussion now takes a closer look at the Scottish Bus Group prior to an examination of the driver's job and the conditions in which it takes place.

2.3 The Scottish Bus Group in Recent Years

Study of the annual reports of the Scottish Transport Group since its inception in 1969 shows a number of interesting trends. One of the most important has been the complete implementation of one-man-operation, and the consequent reduction in the proportion of working expenditure which is accounted for by labour costs, as illustrated in table 2.2 below.

The proportion of routes operated by OMO rose fairly rapidly between 1970 and 1973; it changed little until 1975, and then started to increase again at a fast rate until 100% was achieved late in 1982. It was not introduced at a regular pace throughout the country, however; the 1976 report noted that only 9% of stage mileage was OMO in areas of long-standing staff resistance compared with 90% in predominantly rural areas. In other areas traffic considerations and a shortage of suitable front-entry double deck vehicles delayed its introduction. In 1977 and 1978 new agreements were reached with the platform staff, simplifying the payment structure, consolidating basic

Table 2.2 OMO mileage and labour costs.

Year	% OMO mileage (1)	Labour costs as % of total expenditure (2)
1970	11.5	68
1971	17.8	69
1972	26.9	69
1973	32.7	70
1974	35.4	69
1975	35.7	72
1976	45.4	70
1977	53.7	68
1978	63.9	65
1979	75.2	66
1980	88.2	63
1981	95.2	62
1982	98.8	59
1983	100.0	59
1984	100.0	59

(1) One-man-operated stage mileage as a percentage of total stage mileage (average per year)
(2) Labour costs (wages, national insurance and pensions) as a proportion of total working expenditure.

Source: Annual reports of the Scottish Transport Group, 1971-85 inclusive.

pay and OMO bonuses into a single basic rate, and eliminating anomalies such as separate rates for single and double deck operations. By 1980 staff resistance had been overcome, and the Group was able to report that the only problems delaying the full implementation were those of vehicles and equipment.

The next table illustrates the reduction in the labour force which has taken place since the SBG became part of the Scottish Transport Group, illustrated below for selected years. Employment has almost halved since then (achieved almost totally by natural wastage, redundancies being fairly rare); for the industry as a whole it fell by 28% over the same period. More dramatic was the total elimination of conductors by the end of 1982. Interestingly, this process is now being reversed in some areas. The company operating in the Paisley area, for example, introduced several crew-operated services on an experimental basis in an attempt to compete with similar services operated by its independent competitors (principally McGill's). The experiment was a success, and this company (Clydeside Scottish) recruited 140 conducting staff and purchased rear-platform "Routemaster" buses from London. They were followed in this by the companies operating in the north of Glasgow (Kelvin Scottish) and the Perth/Dundee areas (Strathtay

Table 2.3

Staff Employed, Scottish Bus Group

	1969	1974	1978	1982	1985	% change 1969-1985
Platform:						
Drivers	6,486	5,658	5,622	4,946	N/A	
Conductors	5,923	3,982	2,057	-	N/A	
Other	65	47	55	56	N/A	
Total platform:	12,474	9,687	7,734	5,002	5,181	-58.5%
Engineering	3,654	3,071	3,224	2,734	2,678	-26.7%
Administration	1,715	1,828	1,762	1,558	1,550	- 9.6%
Total	17,843	14,586	12,270	9,294	9,409	-47.3%
Industry as a whole	243,951	215,391	211,089	187,467	174,302	-28.5%

N/A = Not available : figures for platform staff in 1985 were not disaggregated.

Source: S.T.G. Annual Reports, 1978, 1982 and 1985.

Scottish). The number of drivers fell to its lowest level in 1983 (4,941) and has risen slightly since then to around 5,100. The numbers employed in the other categories - engineering and administration - have also fallen since 1969.

In recent years the Bus Group has suffered little in the way of large-scale industrial action by its own employees, and has more often been the victim of the problems of other industries. There was a four week strike by drivers in 1970, over pay and conditions; and in the last three months of 1974 there was a period of unofficial strike action by platform staff (with often intense local picketing). The background to this was pressure at a local level for local wage settlements and for complete withdrawal from the National Council for the Omnibus Industry, the body through which the SBG and NBC negotiated with the trade unions. This was successfully resisted and the NCOI remained until it was disbanded in 1985 when the NBC withdrew. The third major piece of industrial action was a strike of maintenance workers in 1984 which lasted for almost a month. Local strikes have taken place from time to time, but rarely have these lasted for long or spread to other companies in the Group.

A number of the annual reports refer to a good climate of industrial relations (though this is an expression which is hard to define), with communication and consultation between management, unions and employees being encouraged. Employee participation committees were established in 1980, and there is a staff newspaper for the Scottish Transport Group as a whole.

Other industries have had, at times, quite considerable effect on the operations of the SBG. The problem of the British motor manufacturing industry in the mid-1970s resulted in a shortage of new chassis, and delivery dates were well behind schedule for almost five years. This was compounded by problems of unreliability with new rear-engined double-deckers, especially in 1973/74 until prototype trials had identified suitable new vehicles. In the 1960s there had been a move away from the traditional model of double deck bus towards more modern designs. The traditional model, although basic with manual transmission and often an open platform at the rear, was fairly reliable - the engine at the front was easily accessible and the basic level of equipment meant there was little that could go wrong. They were, however, unsuitable for one-man-operation as the driver sat in a cab separate from the passengers, and physically strenuous to drive in congested streets, as the driver had to "double-declutch" each time he changed gear. New designs of double deckers in the 1960s and 1970s were often unreliable in their early years - the engines were less accessible, being placed at the rear - and the vehicles had more sophisticated equipment, such as semi- or fully-automatic transmission and power steering.

These problems reached a head in 1973 when the Annual Report noted that 94 rear engined double deckers had been exchanged for older front-engined buses - this had "proved operationally beneficial" as they were "more reliable and economical than new ones" (p.15).

The difficulties with vehicle reliability and new vehicle shortage meant that there was an increasing proportion of old vehicles in the fleet. Not only did they become increasingly costly to maintain, owing to their age and a shortage of spare parts, but breakdowns were more frequent. Eastern Scottish achieved some notoriety in this respect in 1977/78; as both Hunter (1987) and Johnston (1981) recount in some detail. The shortage of new vehicles meant they had to persist with life-expired buses, which broke down frequently, brought much public protest, and were one of the reasons why a request to the Traffic Commissioners for a fares increase was rejected. At this time Lothian Region Transport had withdrawn the last of their front-engined double-deckers: Eastern Scottish bought several and ran them until they received their own new vehicles.

Vehicle problems, in particular the lack of modern, easier-to-drive buses, and the fairly frequent breakdown rate of old ones, were one of the factors behind a fairly general staff shortage in the mid-1970s. This was particularly noticeable in the central belt (with often well-paid jobs available in manufacturing and engineering) and increasingly in the north-east, with high wages being paid by the companies developing the North Sea oilfield. This affected both the retention of existing staff and recruitment of new ones. The Bus Group also lost a number of skilled maintenance workers to the oil industry. These problems continued until, with the increasing unemployment of the early 1980s, the Group was able to comment,

> . . . a feature of transport is that when times are hard in the economy generally, public transport benefits in staff recruitment and in a resultant improvement in service reliability and an easing of passenger decline.
> (STG Annual Report, 1982, p.12)

The one advantage of fairly high turnover was that reductions in the numbers employed (as a result of operating economies, the phasing-out of crew operation and efficiencies highlighted by "Scotmap") could be made in most cases without the need for compulsory redundancies.

The miners' strike of 1984/85 is a more recent example of the Bus Group being affected by the problems of another industry. In some areas, especially Fife and Ayrshire, there was a significant drop in revenue from both NCB contract services and from regular stage routes. This served to reverse the upward trend in passenger journeys which had occurred in 1983.

Labour turnover has been, and continues to be, costly in terms of both time and money. A driver need give only one week's notice if he wishes to resign, but it may take six weeks to train someone to replace him (and far longer to replace his accumulated knowledge and experience). The process of recruiting and interviewing suitable candidates, sending them for driving assessment, a medical examination and checking their references can take at least one or two weeks. Assuming all is satisfactory, a trainee would then spend a fortnight in the company's driving school, take his Department of Transport test in the third week and spend the rest of that week in learning how to issue tickets and calculate fares. A further fortnight would be spent on becoming familiar with the different types of vehicle the depot has, and in travelling on service with other drivers to learn the routes he will have to operate. The whole selection and training process can amount to a minimum of six weeks (and often longer): if a depot was a driver short then the duties would have to have been covered by the existing drivers working overtime.

The cost of training a driver is less easy to calculate in financial terms, with different companies within the Group producing estimates ranging from £284 to £725 (Scottish Bus Group, 1985). Certain costs can be identified, namely the trainee's wages (around £80 a week), instructor's wages (one instructor may teach three or four trainees at once) and miscellaneous test and medical fees. Others are harder to attribute to individual drivers, such as the cost of fuel and maintenance for the learner vehicles, route learning and additional training for those who fail their test (usually less than 10%). Drivers are also issued with a full uniform (which cannot be reissued to another if it has been worn, even if only for a few weeks), and there are the miscellaneous administrative costs of establishing payroll and personnel records. At present drivers who leave within a year of being trained have to repay a training fee of £350, but this is obviously very much an underestimate of the real costs involved.

The following illustrates how the labour turnover problem has decreased in magnitude in recent years. The Traffic Supervisor at a large depot in central Scotland gave access to his records of drivers entering and leaving service between 1973 and 1985, and these are reproduced in table 2.2. During this period the overall level of employment remained fairly constant (at around 180), but it can be seen very clearly how turnover has fallen dramatically, from 114 leaving in 1974 to only nine in 1985. This depot is situated in Lanarkshire, where unemployment increased considerably in the early 1980s, with the recession in the traditional large employers of labour, such as heavy engineering firms and the British Steel Corporation. The local management at the depot felt that this was the main reason for turnover to fall by so much, especially for those leaving of their own accord. The number of dismissals was especially high in the years 1974-76: indeed in 1975 seven drivers were dismissed in one day for excessive absenteeism. In the

1970s the majority of dismissals were for absenteeism, lateness in reporting for duty, timekeeping whilst on duty or for being drunk whilst in uniform.

Table 2.4

Labour turnover at a large depot in Central Scotland, 1974-1985.

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
Total leaving	114	66	73	59	67	71	46	23	21	18	16	9
Percentage of total number	63	37	40	33	37	39	25	13	12	10	9	5
Reason:												
Own accord	78	37	41	37	45	52	20	18	12	8	11	2
Retired/deceased	8	8	3	4	3	2	1	2	3	7	2	-
Dismissed	27	19	27	6	13	11	16	3	2	1	1	-
Other	1	2	2	12	6	6	6	-	4	2	2	7

Source: Taken from depot employment records

2.4 The job of the driver in the Scottish Bus Group

The following job description form (figure 2.1) is a useful starting point in examining the job of a bus driver. It is taken from one of the few training publications which exist in this field - as Crowther (1985) explains, driver selection and training appears to be left largely to individual companies and groups.

Figure 2.1

JOB DESCRIPTION

JOB TITLE: PUBLIC SERVICE VEHICLE DRIVER - STAGE CARRIAGE

EMPLOYEE'S NAME:...................................... DATE:............

RESPONSIBLE TO: TRAFFIC SUPERINTENDENT

Duties and Responsibilities

1. Drives Public Service Vehicles of groups and classes for which he holds a current driving licence in a safe, lawful and efficient manner to at least the standard of the appropriate Department of Transport driving test.

2. Carries out duties in accordance with the daily operating schedule.

3. Operates vehicle ancillary equipment safely and competently.

4. Reports, without delay, instances of breakdown, route deviation or delay, and reports accurately the details of accidents in accordance with company regulations.

5. Completes accurately all documentation and records of work connected with the operation of the Public Service Vehicle in accordance with training given and company regulations.

6. Will at all times safeguard, maintain and foster good customer relations.

7. Will at all times act in a manner, using initiative and judgement, which will result in maximum benefit to the company and customers.

8. Such other duties as may from time to time become necessary for the operation of the company as directed by the Traffic Superintendent.

Source: Road Transport Industry Training Board, Training Recommendations - Drivers and Conductors, May 1981, p.25.

This highlights a number of aspects of the job. In respect of sections 1 to 3, driving a public service vehicle (on the correct route and in accordance with the operating schedule) is obviously of importance, as is operating ancillary equipment such as the doors, interior lights and heating. The next two sections highlight another important feature - the <u>need to complete forms</u>. In the SBG drivers need to complete a "waybill" each shift, recording vehicle mileage at the start of each journey they make and, in some cases, readings from their ticket machines. Those driving long-distance services also have to set up a tachograph machine, and record details onto the card at the end of a journey. In the event of an accident or undue delay to a journey special forms must also be filled in.

The third important feature listed on the job description is that of encouraging good <u>customer relations</u>. Increased competition in recent years has resulted in this feature being given much more emphasis than in the past, both on long-distance coaches and local stage services. The driver is frequently the only company employee a passenger will see (except perhaps an inspector) - the driver's appearance and manner will therefore determine to a large extent the passenger's opinion of the Company and whether he uses their services again (if there is a choice). One of the reasons behind Clydeside Scottish reintroducing conductors on heavily-used urban routes was that they could help to improve the service offered to passengers. Not only would passengers be able to enter a bus and sit down before paying their fare, but conductors would be able to help load and unload pushchairs, shopping, OAPs, etc. As part of this, many of the Company's buses carry the slogan, "Welcome aboard: we're going your way."

The above job description presents only part of the picture, however. As it was written primarily for drivers, and not driver-conductors, one important omission is that of ticket issuing, the majority of services operated by the SBG being one-man-operated. The driver has to operate a ticket machine (checking stage and fares tables if need be), collect fares and give change. He has to account for all cash collected - any shortages, no matter how small, are deducted from his wages at the end of a week - and for all passengers on his bus having a valid ticket. This means checking all season tickets, return tickets and passes shown to him as people enter a bus. This requires some degree of alertness, as there may be a variety of such tickets (especially in areas where the local authority may issue various kinds of concessionary passes to OAPs, disabled people and school children), and passengers often have a tendency just to show such tickets for maybe less than a second while they board. Responsibility for cash is not something which drivers for some of the other companies have; those with Lothian Region Transport, for example, only have to see that the correct fare is tendered and the right ticket issued. Passengers put their fares into a cash box directly - the drivers are not accountable for every penny collected as the cash vaults are emptied by depot staff at night, and drivers are not allowed to touch the money.

The nature of operations in the industry, certainly for large operators such as the SBG, has always had an effect on hours of work. Many depots operate on a nearly continuous basis (maybe 18-20 hours a day, seven days a week for 52 weeks a year), meaning that neither working hours nor holidays can be the same for all employees. Shiftworking is required, with drivers usually working alternatively an early shift one week and a late shift the next, with the starting times of each being staggered to meet the demands of the timetable. Working at weekends is also necessary, with many drivers being employed under a "5 over 7" arrangement - they have to work any five days out of seven. To increase the attractiveness of weekend work, drivers receive double pay on Saturdays (in many places the busiest day of the week) and time-and-a-half on Sundays. There is no set time for holidays in the industry: in most depots they are either arranged on a rota or by ballot.

An element of variety in the work of a driver can also be found. The role of the SBG in providing the majority of services outwith the major cities (certainly prior to deregulation) means that many routes incorporate a mix of urban and rural driving, an example of this being the Eastern Scottish routes that go between Edinburgh and towns such as Dalkeith, Penicuik and Livingston. In a number of depots there are opportunities for drivers to undertake longer distance coach driving, either on Citylink services, or on private hires and holiday tours. Scheduling requirements often mean that a driver may operate a number of different routes in the course of a shift, in a different vehicle each time. The vehicles themselves vary considerably, both in type and in the ease with which they can be driven; newer buses and coaches have either semi- or fully-automatic transmission, power steering, good ventilation, and often a well-designed cab with controls easy to hand. The same cannot be said for buses more than seven or eight years old. Double-deckers have had semi-automatic transmission since the late 1960s, but the SBG's policy for single deckers was (for many years) to buy fairly basic vehicles with manual transmission. Power steering is rarer in old vehicles; the cab layout tends to be poorer from an ergonomic viewpoint, and driver comfort less well catered for. Heating and ventilation are often less effective, for both the driver and passengers.

<u>Regulation</u> has for long been a feature of the industry in general, certainly until the more recent Transport Acts, and this extends to the job of the bus driver itself. Government controls over the hours of work, in particular, have increased in recent years, especially with the influence of the EEC. There are limits on the maximum length of time spent driving, the minimum length of breaks and the number of compulsory rest days. These conditions are stricter for those driving long-distance express services and holiday tours, than for local stage services, and on the former tachographs have to be used. All this entails a considerable amount of administrative work - those who plan duty rosters have to check that

drivers do not exceed their permitted hours or days of driving. The other major influence is over the driving itself - trainees must undergo instruction in bus driving and then sit a Department of Transport test. This is similar to the test for car drivers, as it includes a section on knowledge of the Highway Code and traffic regulations. Once a driver passes his test he receives a PSV badge bearing his licence number. Bus companies also have to operate under the range of general employment protection and health and safety legislation - the increase of the former in the 1970s (especially that regarding unfair dismissal) was one of the factors leading to a greater codification of company rules and the introduction of a rule book for drivers (Scottish Bus Group, 1984).

The trade unions (in particular the Transport and General Workers' Union) have also exerted influence over the job, especially at company level. The T&GWU have a union memebership agreement with the SBG, in effect meaning that all drivers must be trade union memebers. The union has negotiated set times for "booking on" and "booking off" at the start and end of a shift, to allow for completing waybills, setting up ticket machines and counting cash; there are also allowances for paid and unpaid rest periods in excess of the minimum laid down by law. Drivers who work a "spreadover" shift, to cover the morning and afternoon peak periods (eg. 06.00-10.00 and 14.00-18.00) receive payment for the time they are off duty in the middle of the day. Drivers in the SBG can also receive a number of special payments above the hourly rate of £2.65 (for a 39-hour week). These include a shift bonus, special rates for weekend and public holiday working, overtime (time-and-a-half) and the proportion of their driving that is within large urban areas. Those undertaking the long-distance express duties (such as Edinburgh-London) receive extended booking on/off times to increase the attractiveness of this work: a driver may receive 17 hours' payment for only 8-9 hours actual driving time. The union also oversee a hierarchy which is based on seniority, through which overtime and tours and special duties are allocated.

The third major type of regulation over the job is by the companies themselves. Not only do they have a duty to ensure compliance with both Governmental statutes and trade union agreements, but also they have their own standards which must be maintained. Each driver is issued with a copy of the SBG Driver's Rule Book, which codifies both legal requirements (eg. not smoking whilst driving, not consuming or smelling of alcohol, and overloading a vehicle) and company ones (such as wearing of uniform, ticket issuing and fare collection, and keeping to schedule). There is an agreed disciplinary procedure which allows for a driver to be represented by union officials, and permits appeals to be made to various levels in the Group. (This aspect will be discussed in greater detail in the chapter on research methodology.) There are strict rules and procedures, therefore, but whilst out on the road drivers have relative freedom from the sort of direct supervision found in a factory or large shop. This is felt to be one of the benefits of the job; as long as one keeps to the operating schedule and to the rules there is little need for contact with management. The following quotation from Dudley (1982) illustrates this:

> Throughout the history of the industry, bus operation has been taken up by men who wished to escape from the enclosed world of an office or factory, and who enjoyed the relative independence given to them . . . (p 70).

The major form of supervision is by the use of travelling inspectors, who check not only passengers' tickets but also that the driver is operating to schedule and in accordance with the rules. If a rule has been broken, a report is sent to the Traffic Supervisor, who conducts a disciplinary interview with the driver and takes what action is felt to be necessary. Complaints from the travelling public are in effect another method of supervision, although less reliable, as there are many factors which influence whether someone will make a complaint. However, when complaints are made they are investigated and appropriate action taken.

A further aspect of the driver's job which can be examined is the <u>increased amount of change</u> recently. The road licensing provision of the 1930 Road Traffic Act meant that for many years there was little pressure for large-scale changes in company structures, working practices, routes or timetables, although minor alterations were made from time to time to allow for changing traffic patterns. The situation in the present decade has been very different. The Scotmap exercise entailed, for many depots, a complete reappraisal of all services and routes, with duties and timetables being rescheduled and the length of time allowed for breaks and recovery times reduced. This often resulted in a great upheaval for those drivers (and inspectors) who had long service, and had been operating the same routes without much change for many years. In some cases depots were found to be overstaffed but with natural wastage the number of compulsory redundancies was usually very small.

In preparation for increased competition most depots, between 1983 and 1986, moved away from mechanical ticket machines (such as the "Setright" and "Almex") to electronic ones ("Wayfarer" and "Timtronic") which not only issue tickets but collect valuable data on passenger flows. Before starting a journey a driver inserts his "ACE" (Automatic Computer Entry) into the ticket machine; this subsequently records details of all tickets sold - fare paid, type of ticket, length of journey, and stage and time boarded. At the end of a shift, the "ACE" is inserted into a terminal at the depot where all the data are transferred to the main computer. This can then produce a wide range of analyses on passenger flows, revenue of individual routes, etc., which enable the local management to respond more effectively to changes in passenger demands. As a footnote, computer control and analysis has been extended to the engineering side: records are kept for each vehicle on mileage run, maintenance carried out, fuel consumption, etc.

Mention was made in the previous chapter of the rationale behind the reorganisation of the Scottish Bus Group. This again provided the older-established drivers with some upheaval; many found themselves working for a completely new company with a very different style of livery on its buses. Although a corporate style for fleetnames had been adopted in the mid-1970s (using geographical locations with the "Scottish" suffix, such as "Eastern Scottish" and "Western Scottish"), the companies were until 1985 registered under the names many had had since the 1930s, and older drivers (and passengers) continued to refer to them as "Alexanders" or "SMT". At both depot and senior levels the management structure changed. Previously, a District Traffic Superintendent was in charge of the traffic (drivers') side, and a Depot Engineer was responsible for maintenance. These two positions still exist (with similar duties) but they have been renamed to Traffic Supervisor and Maintenance Supervisor respectively and now report to an Area Manager at the depot. The Traffic Supervisor is still responsbile for selection and dismissal of drivers, and for discipline, but the Area

Manager is now the first level to which an appeal can be made. The reasoning behind the change is a feeling that local management are in a better position to monitor and to respond to the local market (in terms both of what competitors are doing, and of changing travel needs in general) than centralised management at company level. At the senior level the general manager now has a deputy (an operations manager); and the increasing importance of marketing is reflected in the creation of a specific post to handle it. The creation of new positions at depot level, and the general need to present a good outward appearance in an increasingly competitive environment, led to the refurbishment of many depot buildings. Often this included the remodelling of both office and driver accommodation, an upgrading and modernisation of facilities and complete redecoration - in some places, for the first time in many years.

Within the Bus Group the changes outlined above were accompanied (in Autumn 1986) by additions to the types of service offered. Three of the companies reintroduced crew operation (ie. with separate driver and conductor) in particularly busy urban areas, using old London Transport "Routemaster" buses with an open rear platform. Clydeside Scottish, for example, operated them on several routes within Paisley and on the Greenock-Paisley-Glasgow corridor. Most companies also introduced a new concept (which had started earlier in some areas of England) - minibuses. These are larger than the conventional Ford

Transit type of vehicle, seat around 20-25 and are intended for high frequency use. Eastern Scottish, for instance, run a service between Wester Hailes and Restalrig in Edinburgh via Gorgie Road and Princes Street, at five-minute intervals for most of the day. Not only are they frequent, but their size (which does not exceed 22 feet) permits them to travel round streets in housing schemes which conventional buses would be too large for. Other companies have introduced them in some smaller towns, serving areas where it would not be economical to operate conventional sized vehicles.

However beneficial these two innovations might be for passengers, they do have a potentially serious threat to normal drivers. Both involve paying the crews concerned less than a full "OMO" driver receives. A driver just driving a bus (and not collecting fares) is paid the "crew" rate, which is about 17% less than for a full driver (and the conductor is paid about 20% less). Traditionally, all drivers in the Bus Group have been required to hold a full PSV licence, allowing them to drive any size and type of bus. Those recruited for minibus driving, however, only receive a restricted licence (for a single deck vehicle, not longer than 22 feet and with automatic transmission), which means they too are paid less (around 20%). The fear of trades unions is that these new developments (especially minibus operation) will spread and drive down wage rates (and perhaps demand) for full drivers.

A more disturbing change in recent years has been the increase in violence towards bus staff. A Department of Transport committee which examined the subject reported 10,000 such incidents between 1979 and 1983. Of the 2,000 which occurred in 1983, 1157 took place in London (where conductors are especially vunerable). There the rate was one assault per million passenger journeys, in the PTEs/municipals it was one per four million and in the NBC/SBG it was one per eight million journeys (Department of Transport, 1983). The main causes, where discernable, were listed as arguments over fares, lateness of services and drunkenness and hooliganism. In 1983 60% of incidents caused the victim to be absent from work; this resulted in a loss of 20,000 working days. Not only is this costly in terms of absent staff, repairing damaged vehicles, reorganising duties and police/hospital time, but the report highlights the cost of preventative measures. These might include video cameras (used experimentally in several SBG vehicles), two-way radios, protective screens for the driver (first installed in Glasgow PTE buses in 1976) and training of drivers in ways to cope with and defuse potentially dangerous situations. SBG drivers are in many respects vulnerable to assault, as most vehicles have neither protective screens nor radios, and many are likely to have often substantial amounts of cash about their person.

The present decade is seeing great changes in the environment in which bus drivers work - some good, some less favourable - and it remains to be seen what long-term effects they will bring. All this is occurring at a time when the job is becoming harder as a result of the ever-increasing number of vehicles: as existing roads become less able to cope with traffic levels far in excess of those for which they were designed, so competition increases, time schedules in peak periods are harder to maintain, and the potential for stress and strain on the driver becomes greater.

2.5 Summary

This chapter has discussed various aspects of the labour environment in the bus industry by way of background to the research. It has been seen that conditions of work for drivers have varied over the years and that there has been some criticism of management in the previous two decades. Recent developments in the Scottish Bus Group in the 1970s and 1980s were reviewed. The job of the driver was then discussed, taking a basic job description as a starting point and then looking at it from a wider viewpoint - variety, regulation and recent change. The purpose of this has been twofold - to show the importance of the job of the driver in the Scottish Bus Group (and indeed in any bus company) and to highlight some key aspects of the job that feature in an assessment of work performance. The next chapter reviews literature in the field of selection and performance of drivers, as a prelude to introducing the research study proper on which this thesis is based.

CHAPTER THREE

LITERATURE REVIEW

3.1 Introduction

This chapter reviews some of the main themes in the literature relevant to the research. A body of literature exists on the bus industry, but much of this concentrates on economic aspects (such as route costing and planning, pricing policy, and the economic effects of licensing and competition) with very little referring to the labour side. Examination of literature in the area of personnel selection and performance yields useful references, not just on bus drivers in particular, but also on other types of driver where similar techniques have been used.

A number of approaches were made to the search for literature concerning relevant previous research, in other words that carried out on the recruitment/ selection/performance (measurement) of drivers (bus/tram/car/truck/taxi), with special reference to the use of psychological tests. Two computer searches through "Dialog" were conducted, of the transportation and psychology data bases, but these yielded very few useful references. Manual searches using the Social Science Citation Index for the past 20 years were also made, working both from general headings (such as "bus drivers" and "work performance") and from specific authors and titles. This yielded some useful material, as did searches of past volumes of psychological journals such as the _Journal of Applied Psychology_, the _Journal of Occupational Psychology_, _Human Relations_, and _Personnel Psychology_, and using the bibliographies found in relevant articles. A search of the "ASLIB" index of theses submitted to British universities and colleges yielded little.

This chapter has been divided into two sections reviewing different aspects of the literature examined. The first part considers material concerning bus (and tram) drivers. The second looks at studies on drivers in general, which focus mainly on "attitudes", accidents and accident-proneness.

3.2 Literature on bus drivers

Three fairly distinct, historical phases can be identified when examining the literature dealing with bus drivers. The first was the 1920s and 1930s, where mechanical tests were used to determine a person's aptitude for bus (or tram) driving, in particular in the USA and Germany. The second period encompasses the late 1940s and 1950s, and concentrates to a large extent on the work of Ghiselli and others. The final period, covering the 1960s to the present, consists of a variety of different studies which appear to focus more on qualitative rather than quantitative aspects. It should be said at this stage that the term "bus drivers" is being taken in a very wide sense. The job nowadays, and the situation in which it takes place, are not necessarily the same as they were in the 1920s and 1930s: more physical effort was required then, the driver did not usually collect fares and the traffic and road conditions were very different. Similarly, the literature comes not only from Britain but from Europe and the USA: again many cultural and social differences mean that their conception of the job is not strictly comparable with ours.

3.2.1 Research up to 1939

The idea that psychological tests can be used to predict the performance of, and select, drivers of public transport vehicles is long established. In the first period of the literature (up to the start of the Second World War) the concern appeared to be in selecting people who would make safe (and therefore accident-free) drivers of both trams and buses. The tests used in selection were mainly of a mechanical nature, designed to test abilities such as visual acuity, reaction time, mental alertness and presence of mind. (Tests such as these tend not to be used nowadays.) Viteles (1925a) reviewed some of the early studies in the field, the first being by Munsterberg in 1912. His mechanical apparatus was intended to measure how well drivers could monitor the road in front of them and foresee possible movements of pedestrians and vehicles. This may well have been a forerunner of work on speed of closure (which led ultimately to the development of the Word Recognition Test, used in the present research study), judging from a remark of Munsterberg (1913):

> ... there are motormen who practically never have an accident because they feel beforehand even what the confused pedestrian and the unskilled chauffeur will do, while others relatively often experience accidents of all kinds because they do not foresee how matters will develop. (p.64)

Little detail is reported on the results of this test, but it appeared to have been reliable when compared to numbers of accidents. Munsterberg died in 1916 but his test was adapted and developed by Gerhardt (1916), who achieved some success in selecting good quality tram drivers - not only were the number of accidents reduced but also labour turnover decreased. A word of caution should be issued here as neither researcher issued precise details of correlations or reliabilities of their tests, nor indicated how many men were tested.

Viteles reports that McCants was another early worker in this field. One of his studies compared records of service of motormen in San Francisco with biographical data as supplied on their application form. Factors not relevant to performance included citizenship, complexion, colour of hair and previous occupation. Of relevance were found to be height, age and place of birth, with the best group being of American and North European origin, having more insurance and property, possessing greater wealth and being better educated. The poorest group of employees (in terms of service record) were those of

Mediterranean and Irish stock. Another of McCants' studies involved assessing whether intelligence (as measured by the Army Group Tests) was related to performance. There was a very small, positive relationship between test score and value to the company, but this was not statistically significant. Despite possible shortcomings of these investigations, Viteles (1925a) noted that there was, within the industry, a strong interest in the use of tests to select motormen at this time. He says, "It is interesting to note that Gerhardt and McCants are both practical railroading men and not psychologists" (p.106).

A number of major investigations were also undertaken in Germany in this period, again summarised by Viteles (1925a). Piorkowski criticised Munsterberg for concentrating just on qualities of attention (to what was happening on the road) and failing to test ability to respond to stimuli. Attention and response to varied stimuli were combined into tests developed initially by Stern and later by Bobertag and Sachs, along the lines of an early tram simulator, but results at the time of Viteles' article in 1925 were inconclusive. An extensive study was undertaken by Tramm at the Greater Berlin Tramway Company in the early 1920s (reported by Gradenwitz (1922)) consisting of a battery of tests to which applicants were subjected. These tested qualities such as behaviour in the event of danger, "cold bloodedness or nerve", presence of mind, colour and night vision and intelligence (in the sense of understanding the mechanical principles of a streetcar). They appeared to have achieved some success in selecting good quality employees: in one case an experimental group of 50 employees were hired and compared with a control group (hired at the same time but not using the tests). In the first year the experimental group had a third less accidents than the control group, and in the second year 40% fewer accidents. In addition to this, the tests were found to be useful in re-engaging experienced drivers, and in allowing a reduction in training time.

Viteles himself used psychological tests to select motormen for the Milwaukee Electric Railway and Light Company (Viteles, 1925b). He devised the Viteles Motorman Selection Test to measure reaction to visual and auditory stimuli, and in addition used intelligence and personality tests. Some of the tests, when used experimentally, yielded significant correlations (such as scores on the judgement test and ratings on courtesy and general ability), whereas others did not (for example, intelligence and ratings on safety or general ability). The major problem, however, was that ratings on the motormen by instructors or supervisors were considered to be too subjective and liable to the influence of bias. As an intermediate solution, Shellow (1926) compared motormen recruited in 1924 (without the use of tests) with those selected by the use of tests the following year. After one year, 40% of those recruited in 1924 were no longer employed (23% having been discharged).

For those selected by the tests in 1925, only 28% were no longer there a year later, with only 5.4% being dismissed. The difference is all the greater when the numbers discharged for accidents are examined: 14% of the unselected group was in this category compared with only 0.6% in the selected group. Later studies by Shellow and others concentrated on making the supervisors' ratings more objective (Shellow and McCarter, 1927-28).

A study by Bacqueyrisse (1935) on tramway and bus drivers in Paris was also concerned with selecting safe drivers. He referred to the number of accidents declining as psychological tests were introduced in selection in the 1920s. The average number of accidents per driver was 1.53 in 1923: ten years later it had fallen to 0.27. Over this ten-year period the number of motor vehicles registered in Paris increased three-fold; the total number of accidents increased by 154% but the number involving trams and buses fell by over a third. In 1923 buses and trams were involved in 22.7% of accidents: by 1933 they were involved in only 5.6% of accidents. Not only were the psychological tests used in initial selection of drivers, they were also administered to existing drivers - those found to be unsuitable were transferred to non-driving work. Bacqueyrisse's article has one intriguing fault, however - he gave no details as to what the tests were.

One of the few research studies of this nature in the UK was by Farmer and Chambers (1939), who produced a report on accident-proneness for the Industrial Health Research Board. They investigated whether psychological tests could be used to measure differences in accident liability by looking at bus drivers in London, trolley bus drivers in two towns and army drivers under training. Some evidence was found of a relationship between accident rate and age. The rate tended to decrease as one got older, with a slight increase around middle age followed by a fall again. Farmer and Chambers felt that this may be due to advancing age coming almost imperceptibly upon people, so that they continued to take the same risks as they did in their earlier years. When they were definitely old (whatever age that might be) they realised that this could no longer be done and so were more careful. The researchers also found that, for bus drivers, the number of blameworthy accidents decreased with length of service but that the number of blameless ones increased, as shown in table 3.1 below.

Table 3.1

Accidents for a group of London Transport drivers (n=166)

Type	Year 1	Year 2	Year 3	Year 4	Year 5
Driver responsible	215	156	133	146	103
Driver not responsible	86	100	135	104	152

(Farmer and Chambers, 1939, p.16)

The blameworthy accidents were directly linked with the driver's power of control over his vehicle, which tended to improve at least over the first few years.

Farmer and Chambers used a variety of psychological tests, but with only a limited degree of success. In general they found that significant relationships between the tests and accident rates existed only with beginners of equal age and experience. There was no significant relationship when they were applied to trained workers with differing ages and experience. They felt that this was because experience developed in a worker mental and physical habits which tended to lower the accident rate but which could not be measured by their tests. The aesthetokinetic tests (including tests of "dotting", co-ordination and an "interrupted pursuit meter") were positively related to accidents when measured over a long time period. The intelligence tests, on the other hand, were of a paper and pencil variety and caused the older drivers to feel nervous:

> The general trend of their remarks is to the effect that they have left school a long time and cannot be expected to do tests of this kind. (p.26).

Consequently, there was a wide difference between the average score for drivers (mean age of 28) of 64 and that for 16-year old apprentices of 120. A simpler version was developed but found to be equally unsuitable.

A final example of this kind of mechanical test was the American Transit Motor Ability Test, discussed by Waits (1946). It attempted to measure abilities, such as learning quickly, reacting quickly, following directions, coping with difficult situations and physical co-ordination. The test was administered to 290 men (both bus and tramcar drivers) and the scores correlated with their accident responsibility rate and "total desirability" rating. Each collision was assessed for the degree to which the driver was at fault (on a five-point scale, from "no responsibility" - to "totally responsible"); these weights were summed and the total expressed in terms of the number of accidents per 100,000 driving hours. Fairly low, although statistically significant, product-moment correlations were obtained between this accident rate and the test: for streetcar operators, r=.29; for bus drivers, r=.43; and overall, r=.33. Supervisory ratings, based on the individual's desirability and worth to the organisation, produced a much lower correlation of r=.09 with the test but r=.48 with the accident rate. Waits did not regard these results as being formally conclusive, but felt they pointed towards a potential usefulness of the test in selection. Looking at those who scored above and below the mean score on the test, if those who scored below it had been rejected at selection, then 25 out of the 29 with the worst accident records would have been rejected. Taking those who scored above it, 27 of the 29 with the best records would have been selected.

3.2.2 <u>1940s and 1950s</u>

The middle section of this part of the literature review, although the shortest, contains material that is perhaps most relevant to the current research project. Brown and Ghiselli undertook a large programme of research in the late 1940s, measuring the relationships between tests and actual work performance, with a view to advising on selection. They did not neglect public transport, and at least four such studies were reported.

One of the first concerned motor coach operators. Brown and Ghiselli (1947) used, as predictors, an intelligence test score, age, amount of education and marital status for people who applied for work in a large US city transit company in 1943 and 1944. The criteria measures used were accident rate, length of time on the job, and whether the applicant actually reported for work (only 68% of applicants did so). The correlation between the last of these and intelligence test score was r=.23: this assumed some significance when considered with the maximum score suggested by the reseachers. 32% of the entire group of 363 applicants failed to report, but 51% of the group scoring less than 30 were in this category. On the whole the correlations were so low as to be of no use, the one exception being age and length of time on the job with a coefficient of r=.21. The authors concluded that none of the predictors would be of use in selection.

The concept of accident-proneness was also investigated by Brown and Ghiselli (1948) with respect to motormen and coach drivers. They were concerned with the relationship between different types of accident, to see to what extent an individual could be classed as "accident-prone". Accidents were divided into two main categories - collision (collisions with pedestrians, trolley cars and motor vehicles) and non-collision (boarding and alighting accidents, and accidents aboard the vehicle, such as passengers stumbling). Correlations between the five individual categories were on the whole low, the highest being of r=.22 between collision with trolley cars and with motor vehicles, and of r=.19 between boarding and alighting accidents and on-board accidents. Similarly, the correlations between the two main categories of accidents were very low. The authors were unable to substantiate accident-proneness as a general trait.

Ghiselli and Brown (1947) also studied the effect of on-the-job learning in accident reduction for both motormen and coach drivers. They found that the actual motor co-ordination required to operate a streetcar was fairly simple and could be learned in under an hour. Similarly, a coach driver was required to have previous driving experience and so had mastered the basic movements before being given any formal training. The most difficult aspect for both groups, however, was the complex activities which required judgement of speeds and spatial relations, often performed under conditions of stress. Studying the accident research for 60 motormen and 34 coach drivers, they found that most of the reduction in accident rates took place within the first six or seven months. However, after that they continued to decline (at a slower rate) to beyond the seventeenth month, with accident rates falling by more than half over the whole period.

The theme of using tests to predict accidents was the subject of another paper by Ghiselli and Brown (1949). They referred to the pre-war work using apparatus tests (such as those devised by Viteles), and felt their application was limited on grounds of financial, administrative and physical constraints. Instead, they preferred the use of paper and pencil tests and referred to the results of their work with motormen in San Francisco. Their "dotting" and "tapping" tests had a correlation of r=.35 with accident rate. The main study referred to in this particular article was the use of these and other tests in predicting accidents of another type of public transport operator - the taxicab driver. Eight speed tests and an interest inventory were used as predictors. These paper and pencil tests included those of "dotting" (putting dots in circles one-eighth of an inch in diameter, irregularly spaced) and "tapping" (putting three dots in circles of one-half inch in diameter) referred to already. In addition, there were tests of judgement of distance, distance discrimination, mechanical principles, arithmetic and two of "speed of reactions" - an attempt to transfer the mechanical Viteles test to paper and pencil form. The interest inventory (with no time limit) required people to choose one job from a choice of two, for each item, and produced four sub-scales concerning occupational level, outside occupations (ie out of doors), dealing with people, and occupations related to driving. Several biographical items were also used as predictors, such as age, years of formal education, years of previous taxi driving experience, and total driving experience.

Sixty-seven men were tested (those who were employed by a taxi company within a 3-month period), and after 5 weeks divided into an accident-free group (48 cases) and an accident group (19 cases). Validity coefficients for the predictors were calculated, and there was considerable variation between these. Coefficients were calculated as .35 for the dotting test, .47 for the tapping test but much lower for the others. Distance discrimiation had a coefficient of .20, but the arithmetic and speed of reactions tests were below 0.1. The low coefficient for the lattermost surprised the authors (as the Viteles Motormen Test, on which they were based, has useful predictive power), and led them to conclude that certain types of abilities, important for safe driving, could not be measured by written tests. The interest inventory, in total, yielded a score of .28 (with .23 for both occupational level and outside occupations), but the personal data brought correlations of less than .1. Ghiselli and Brown were able to conclude from this that accidents could be predicted by paper and pencil tests, but expressed concern that the highest coefficients were obtained from the two shortest tests: the dotting and tapping tests took thirty seconds each.

The results which Brown and Ghiselli have obtained in this area, and in particular in the study described immediately above, lead this author to insert a comment here. The concern of these studies, and to a large extent also those of the pre-war period, was the selection of safe, accident-free drivers. While this is undoubtedly an important aspect of a driving job, it is by no means the only aspect of being successful in a job. The research up until this period seems to have placed much less emphasis on data concerning other aspects of successful performance, such as attendance at work, coping with paperwork and administrative details, appearance, and ability to handle customers. These would, the author feels, be of some importance in a job such as the taxi driver's (especially dealing with customers and fare collection), yet no notice was taken of these in selecting criteria. One wonders what the correlations would have been, for example, between the arithmetic test and accuracy in cash collection, or the "dealing with people" scale on the interest inventory and a scale of complaints about rudeness.

A broader examination of work performance was found in McFarland and Moseley's (1954) book on the human factors involved in road safety. They report a research study of 200 long-distance bus drivers in the USA who were given a battery of four psychological tests: the Kuder Preference Record, the Otis Employment Test (of intelligence), Johnson's Temperament Analysis and the Minnesota Multiphasic Personality Inventory (MMPI) - short form. (Most of these are still in use in the 1980s.) The drivers were also categorised into the best 50 and the worst 50 by the company's safety director. This was based on the following criteria: (i) accident record (blameworthy); (ii) lateness; (iii) absenteeism; (iv) disputes with supervisor; (v) arbitrations; (vi) infringements of the law; and (vii) relations with passengers (in terms of complaints). The object was to find which of the 1139 items on the four tests could discriminate between the good and bad drivers - at a 5% significance level 98 fell into this category, which the authors felt would form the basis of a new, shorter test battery.

Heron's (1954) study of bus conductors employed by London Transport is useful as he took a fairly broad approach to the measurement of work performance. He was concerned with looking at job satisfaction and "satisfactoriness" - value to the employer - studying 144 conductors after the first 26 weeks of employment. Feelings on job satisfaction were obtained from two questionnaires, and after statistical analysis an overall score was obtained. A rating of "source of concern to supervisors" was obtained and used along with five variables from personnel records. These were gross earnings (regarded as a legitimate measure of value, as it was direct measure of the extent to which individuals varied in their willingness and availability to undertake overtime), shortages in takings, number of periods of absence, disciplinary actions (for offences such as failure to collect fares or to alter destination blinds at termini) and number of times when late for duty. These six variables were then intercorrelated. Most variables were fairly closely related to each other; for example, supervisory rating correlated r=.30 with gross earnings, r=.51 with cash shortages, r=.38 with periods of absence and r=.48 with lateness. The exception to this pattern was disciplinary actions. Heron explains this fact as being due to the separation (at depot level) between the supervisory staff in the garage and those out on the road, so far as the conduct of individual conductors was concerned. This relatively independent variable has some correlation between shortages (r=.23) and lateness (r=.27), which suggested some significant pattern of individual differences. This may have been a reflection of a form of behaviour which had at one end of a scale "irresponsibility" and at the other "meticulousness".

The next stage was to submit the variables to a centroid factor analysis. Two factors were extracted, accounting respectively for 32.4% and 8.3% of the variance. The first, general, factor loaded most heavily on ratings, shortages, absence and lateness; the second on earnings, shortages and absence. Heron took the general factor (named "value to the employer") and found that it had a multiple correlation with rating, earnings, shortages and lateness of r=.86. This composite score was significantly and linearly correlated with age (r=.52), leading to the conclusion that younger men tended to be more often late, to be less available for overtime, and to have larger discrepancies in their cash. Taking the job satisfaction and the value to the employer scores together, they were found to be correlated r=.35. Although Heron was more concerned with job satisfaction, his work on classifying performance criteria for his employees was of great use to the present author, as is discussed in the next chapter. He was also one of the first researchers in this field to use a form of factor analysis, albeit a fairly rudimentary version.

2.2.3 <u>1960s to the present</u>

The final section of this part of the literature review deals with research studies on bus drivers from the 1960s to the present. A number of studies have been published in this area, but few are directly relevant to the present research, most being in the qualitative area. Perhaps the most appropriate, at least in terms of its title, was the study by McKnight et al (1971) entitled The selection and training of school bus drivers in the USA. They administered questionnaires to nearly 3,000 school bus drivers, both newly-employed and experienced, looked at their background and compared these with supervisors' ratings of performance. In terms of background they found that the better drivers (in terms of supervisors' ratings) were those over 30 years of age, and with at least 3 years' bus driving experience. Both of these characteristics were statistically significant. In addition, they had received between 8 and 12 years of formal education, and were married with children who were of school age. The tests and questionnaires used included those of knowledge (of traffic regulations, of how a bus worked), driving skill (assessed on the road) and attitudes and personality. The knowledge and performance tests both showed significant differences between the experienced and newly-employed drivers. When both groups were divided into the better and poorer drivers, the knowledge tests only correlated significantly with the performance of the new drivers. The other tests showed little or no statistical significance when correlated with the ratings.

McKnight et al also looked at the necessary physical characteristics required for the job, such as general fitness, eyesight, hearing and freedom from drug-taking. As far as their recommendations for selection go, they felt that background characteristics (with the exception of driving record, and despite the findings reported above) on their own could not be used to reject a person as they were not directly related to driving. All that they could do would be to give clues as to possible problem areas which would be investigated further. They considered that psychological characteristics (including knowledge, performance and attitudes) should be assessed through interview, observation and references, rather than by tests, as "available standard personality tests lack sufficient validity to be employed for selection purposes" (p.8). In their review of literature in the area of driver performance (in addition to finding very little material on bus drivers), however, they had concentrated on studies made in this area and on the tests that these studies had used (such as Viteles). It would appear that little, if any, thought was given to using other (more general) psychological tests such as Cattell's 16PF (which even in 1971 was well-established and well-used) which might have yielded more useful results.

Two studies by I D Brown in the 1960s looked at ways of predicting which trainee drivers with London Transport would pass their Public Service Vehicle (PSV) test at the end of training. The pilot study (Brown, 1966) compared the results of 22 trainees taking the PSV test with their previous driving experience, weekly progress checks on driving ability, objective measurements of the use of a vehicle's controls and reserve capacity as measured by performance on a subsidiary auditory task. The training lasted five weeks, with progress checks taking place at the end of each week. Several significant relationships were found comparing those successful at the PSV test with those who were not. All those with previous driving experience were successful, whereas only 5 of the 14 with no experience passed. At the second weekly progress check of driving ability (made by an experienced examiner) 15 passed, 13 of whom went on to pass the full test. All 6 of those who failed subsequently failed the PSV test. No significant differences were found on the objective measures of the use of the vehicle's controls, but on the seventh day of training there were differences between groups on the subsidiary auditory task.

Brown felt that these measures could be used to select-out potential failures, and a further study was made two years later, this time with 52 driver trainees (Brown, 1968). In addition to looking at whether the trainees had previous driving experience, after seven days their driving skill was assessed by an examiner, the time taken to drive a standard route was measured, and they were given the auditory task again. In particular, Brown was interested in the extent to which there was a transfer of training for those with driving experience. With regard to previous driving experience, there were two clearly-defined groups - experienced "natives" among those successful at the PSV test and inexperienced "immigrants" among the failures. Brown considered that the previously-learned skills which were positively transferred were perceptual (ie experience in driving in conditions similar to those in which the test took place) rather than motor. Using previous experience in selecting trainees may not be entirely accurate, as it depends on subjective estimates of driving ability from the trainee himself. The objective measure of the use of the vehicle's controls did not yield appreciably significant differences, but performance on the auditory task did. The assessment of driving skill by an examiner was also considered a good prediction - this was accurate in over 80% of the cases.

The final two quantitative studies in this section are both concerned with accidents, the first in connection with age, and the second with the differences between part- and full-time drivers. Spratling (1961) investigated accidents among London Transport bus drivers in the late 1950s, but did not take account of the severity of each or whether the driver was blameworthy. Age and experience (in terms of length of service) were both significant factors - drivers under 30 years of age, and drivers with a short length of service (of all ages) both had high accident rates. As experience increased, accident rates fell (most noticeable in the early stages) and the older short-service drivers had a lower rate of accidents than the younger drivers in this category. Spratling felt that experience, therefore, was the more important factor affecting accident rates.

Hunt (1984), under the auspices of the Department of Transport, conducted a study of the differences in accidents between part-time and full-time bus drivers, among both publicly-owned companies (PTEs/NBC subsidiaries) and private operators. The public operators had more than ten times as many accidents per bus (and per driver) than the private companies: 940 accidents per 1,000 buses compared with 87 accidents per 1000 buses for private companies; the proportion of drivers who were part-time varied between 50% for private operators with fewer than five buses to 23.5% for those with more than 50 vehicles, and was 16.9% for the PTEs and NBC subsidiaries. (The mean for the whole sample was 33%). The accident rates per 1,000 man driving hours were as follows:

Table 3.2

Accident rates for full- and part-time drivers.

	Full-time	Part-time
Private companies	1.41	1.34
Public companies	16.82	5.09
All	6.29	1.81

Source: Hunt (1984).

Using a chi-squared analysis there were no significant differences between types of driver in the private sector, but there were for public sector drivers. There were significantly more accidents among full-time drivers and fewer accidents among part-time drivers than expected. Hunt's conclusions on the differences between the two sectors are not entirely unsurprising: there are more accidents in the public sector because much of their work is stage carriage (intensive urban services), and because a greater proportion of their drivers are younger (with younger drivers tending to have higher accident rates). Regarding the differences between part- and full-time, he remarked that the NBC/PTE companies tended to employ part-time drivers in the evenings and at weekends when traffic is lighter (and therefore when there is less risk of an accident); the full-time drivers tended to be younger (more in need of steady employment) with longer hours of work (most of their accidents took place between the 4th and 6th hours of duty, and after the 8th hour). Other than being useful sources of statistics, however, both Spratling's and Hunt's articles broke little new ground in the study of bus drivers.

The search for appropriate literature revealed a number of more qualitative studies of bus drivers, either focussing on aspects such as job satisfaction and morale, or being autobiographical accounts of a driver's life. Some have been mentioned in the chapter on the labour background. They have been of some use in providing a picture of the driver's job, the conditions under which it takes place, and will be referred to in the analysis of the results from the current research. Two of the studies are mentioned here. Van Beinum's The Morale of the Dublin Busmen (1966) was a study carried out by the Tavistock Institute in the 1960s. The organisation of the industry within the Scottish Bus Group in the 1980s still bears much resemblance to the system in use in Dublin twenty years previously. The low morale of the busmen was analysed in terms of the characteristics of the job, the management system and trade union structure, and their roles. A socio-technical analysis was employed but no specific recommendations were made and the author had to conclude when the report was published three years after the research, that the only changes which had been made were better quality uniforms and an improved pension scheme.

Johnston (1981), writing 15 years later, took a different approach in looking at the busman's job from a sociological, "labour process" view, focussing on control and reactions to it. His themes were the control of busmen by their organisations, and the busmen's struggle for control over their work tasks. This thesis was useful for its historical aspects and interesting on account of most of its examples coming from the author's experience as both driver and conductor at Eastern Scottish's New Street depot in Edinburgh and has been discussed in more detail in the previous chapter.

3.3 Literature on drivers in general

A substantial amount of literature has been published on drivers in general, much of it concentrating on personality factors and attitudes which may give rise to accidents or traffic violations. The bulk of this is American in origin, and appears to be concentrated in the 1950s and 1960s. This section of the chapter reviews some of the main articles felt to have some relevance to, or connection with, the present research, in terms of methodology.

Several studies have looked at the relationship between psychological tests and driver performance - some have achieved significant results, others have not. Taking those in the former category, a few studies have used the personality test employed in the research set out in this thesis - the Cattell Sixteen Personality Factor Questionnaire (16PF). [A full discussion of this test is given in the next chapter.] Freeman (1952, quoted Suhr, 1953) found two factors which differentiated significantly between groups of accident-free and accident-liable drivers - factors E (submission - dominance) and Q1 (conservatism - radicalism). A high score on each was associated with accident involvement. Suhr himself made two studies using this test on truck drivers. The first (Suhr, 1953) compared supervisors' estimates and ratings of accident susceptibility, finding that those who were rated high also had higher scores on factors F, M* and O and lower scores on C* and Q3*.

[Those marked * were significant at p=.10 or greater, the remainder were approaching that level.] Those with higher accident levels had lower scores on G* and Q3 and higher scores on M and Q4. His later study (Suhr, 1961) confirmed these results, by comparing another group of truck drivers on the basis of high and low accident records. Those with a high number of accidents also had higher scores on factors F and M and lower scores on Q3 (F and Q3 at nearly p=.10; M at p=.05).

Bracy (1970) also found that personality factors differentiated between accident-involved and accident-free drivers, on a study of 80 undergraduate university students using the 16PF. Those in the former category differed from the latter in factors A, F and O (all at the "high" end) and Q2 (low end of the scale). The following summarises these studies and defines the meaning of the factors briefly.

Table 3.3

Summary of 16PF factors found to be related to accidents

Factor	High acc. Direction	Description (low/high score)
A	High	Reserved/outgoing
C	Low	Emotional stability (low/high)
E	High	Humble/assertive
F	High	Sober/enthusiastic
G	Low	Expedient/conscientious
M	High	Practical/imaginative
O	High	Self-assured/apprehensive
Q1	High	Conservative/experimenting
Q2	Low	Group-dependent/self-sufficient
Q3	Low	Uncontrolled/self-controlled
Q4	High	Relaxed/tense

"High acc." direction = direction of scores linked with high numbers of accidents.

Continuing with research which has produced significant results, Goldstein and Mosel (1956), carried out a factor analysis of driver attitudes and criterion data. Attitudes towards all aspects of driving (such as speed, other road users, highway laws and risk taking) were obtained from a 186 item self-report inventory completed by 323 general drivers. Data was also collected on years and miles driven, numbers of traffic violations and accidents, and cost of damage/injury in accidents. Thurstone's centroid method of factor analysis identified five factors - (a) "attitude towards competitive speed", (b) "attitude toward other road users", (c) "attitude toward cops", (d) "attitude toward the vehicle", and (e) "a general attitude of care or concern for safety".

A number of interesting correlations were found in the analysis. For the women in the sample (69 cases) there was a significant correlation between "attitude toward speed" and number of violations of r=-.28. "Attitude towards cops" had correlations with total accidents (r=-.28), accidents at fault (r=-.28) and number of traffic offences (-.24). Different relationships were found for the male drivers on the sample (246 cases): "attitude towards cops" was correlated with age (r=.19); "attitude towards the vehicle" with both number of years driven (r=.20) and miles driven (r=.26), "better" attitudes being found with greater experience. The authors undertook some further analysis on aggression (or competitiveness), finding that it was significantly related (for just the men) positively to violations (r=.13) and accidents at fault (r=.14), and negatively with age (r=.13) (younger men being more aggressive). [All three were significant at the 0.05 level.] They felt that only greater maturity reduced aggressive attitudes, as these were not related to either years driven or miles driven.

A different approach has been taken by some researchers who have used both data from personality inventories and from biographical questionnaires as predictors in multiple regression analyses, in an attempt to predict accidents and traffic violations. Schuster and Guilford (1962) were one of the first groups to publish in this area. They used a General Attitude Survey, comprising 22 personality traits they considered might be relevant in predicting accidents. The traits were gleaned from several published questionnaires, including those of general activity, restraint, sociability and friendliness from the Guilford-Zimmerman Temperament Survey. In addition, their Driver Attitude Survey collected data on 24 biographical items covering a wide range, such as age, race, years of driving, education, physical and mental health, number of employers in previous two years, and details of all motor accidents and traffic convictions.

In multiple regression analysis, of predictors with violations and accidents, they found that it was the biographical items which were more important (statistically) in prediction than the attitude or temperament variables. From the table below, which summarises the statistically significant correlations, it can be seen that for violations, years driven, annual mileage, condition of car and amount of rural driving were all significant at p=0.05 or better, whereas only one attitude item was - general activity. Further items were correlated with accidents (although all were at p=0.05 level of significance only); in addition, the number of employers in previous two years and the personal relations attitude scale were important.

Table 3.4

Summary of significant correlation coefficients with violations and accidents (n = 100)

Item	Violations	Accidents
Years driven	-.24*	-.21*
Annual mileage	.28**	.23*
No of employers in 2 years	.18	.22*
Condition of car	.31**	.24*
Amount rural driving	.35**	-.05
General activity	-.22*	.12
Personal relations	-.15	-.20*

* Significant at p=0.05 level, using Student's t test
** Significant at p=0.01 level, using Student's t test

(Adapted from Schuster and Guilford, 1962, table 1, p.19)

In both cases general attitude scores for both violations and accidents were significant, and the number of accidents and violations were correlated r=.38 (at p=0.01 level of significance). These findings enabled Schuster and Guilford to construct regression equations. In cross-validation the predictors correlated p=.37 with violations and p=.33 with accidents.

A later study, reported by Schuster (1968), found the reverse to be true when regression coefficients were compared with actual violations and accidents after a gap of three years. The best predictors came from the accident and violation attitude scales combined with records of previous accidents and violations, with biographical data adding no additional prediction. The cross-validity coefficients were around the same for accidents (0.32) but higher for violations (0.49). Peck and Coppin (1967) employed a similar approach in an attempt to predict accident involvement from a variety of categories of traffic convictions, but found the relationships too small to draw any practical conclusions from.

A more straightforward correlational analysis of test scores and driver performance (measured only by an accident rate) was carried out by Moffie and Milton (1952) on long-distance lorry drivers in the USA. Five psychological tests of the paper and pencil variety were used: the Otis SA Test of Mental Ability, the Bennett Test of Mechanical Comprehension, the Kuder Vocational Interest Test, the Bernreuter Personality Inventory and the Minnesota Multiphasic Personality Inventory. An accident score was calculated on the basis of weighting preventable and non-preventable accidents, and dividing this into the number of months worked. 191 drivers were tested, all of whom had at least six months' experience, and were divided into three groups, an accident group of 30 drivers were matched with 30 similar accident-free drivers, a group of 100 drivers with 6-12 months' experience, and a group of 31 drivers who had been employed for 12-18 months. For the first two groups, a number of significant correlations were found. Personality-wise (as measured by the MMPI), the accident-free drivers tended to be more tense, less self-sufficient and less dominant than the accident drivers, although none of these differences were significant even at the 0.05 level. The Bennet Mechanical Comprehension Test indicated that the accident-free subjects had a greater grasp of mechanical principles, (with a mean score of 27.90 compared with 21.47 for the accident group, significant at p=0.05) but, perhaps surprisingly, the accident drivers had higher scores on computational interest items (a mean score of 34.54 compared with 30.60 for the accident-free group, again significant at p=0.05).

A positive relationship between mechanical interest and accidents was found for the group of longer-service drivers. This took the form of positive correlations between the Bennet test and accidents for drivers with six to eighteen months' experience (r=.19) and between the mechanical scale on the Kuder test and accidents for the group with twelve to eighteen months' experience (r=.44). The first was significant at p=0.05 level and the second at 0.01 level. This lead the authors to suggest that the nature of the job (in terms of its hazardous conditions, the dual nature of its operation - the drivers worked in pairs - and the disruption of home life) may cause psychological changes in those who stay for a long time. This interesting aspect was not pursued by further research. Moffie and Milton made a further remark about the better drivers - the negative relationship between them and self-sufficiency indicated that they were more dependent on others, more hesitant and cautious in their driving habits, and therefore more likely to assess traffic situations before driving into them.

Conger and his colleagues carried out similar - and more extensive - large-scale studies on US airmen in the late 1950s, but achieved little in the way of satisfactory results. In their first major study Conger et al (1957), 264 airmen were subjected to a very thorough battery of psychological tests (including the MMPI, the Thurstone Temperament Scale and the Allport-Vernon study of values), structured psychiatric interviews and projective tests such as the Thematic Perception Test and the Rorschach Ink Blot Test. The airmen were divided into high-, moderate- and low-accident groups, but only 10 scales discriminated between these groups at p=0.20 level of significance, and only 1 at the p=0.05 level. A cross-validation study showed that only one type of measure was stable - the individual's value system, as measured by the Allport-Vernon scales dealing with aesthetic, theoretical and religious concerns. The no-accident group had low scores on the first two scales and higher scores on the last.

This finding surprised the authors, and in a follow-up study of 20 airmen (10 of whom had had road accidents and 10 of whom had not) similar results occurred (Conger *et al*, 1959). In addition, ratings of the subjects on a number of criteria following psychiatric interviews showed statistically significant differences between the two groups. The accident subjects tended to be less able to control hostility, either to be excessively self-centred or excessively sociocentric, to be more fearful of loss of love and support, and less able to tolerate and control tension. Not all subjects fell into each category, however, and the small size of sample precluded any recommendations in this area. On the objective test side, the American transit motor ability test discriminated between the two groups, the accident group reacting more quickly and taking less time to complete the task but making more errors than the other group. Little of significance was obtained from the other tests - the Wechsler-Bellevue adult intelligence scale, the MMPI and the projective ones. In a third paper Conger (1960) summed-up his finding that it was attitudes rather than physical or intellectual qualities which determined accident rates.

A single personality test - the MMPI again - was used by Brown and Berdie (1960) in a study of nearly 1,000 college students. The criteria of driving behaviour used were again traffic violations and accidents, along with years driven and annual mileage, for a period of between four and six years since taking the test. A few small, but significant, relationships were found between scores on the test and the criteria. In particular, the Pd scale had a correlation of r=.10 with violations and r=0.08 with accidents, and the Ma scale had correlations of r=.07 and r=.09 respectively (all significant at the r=0.05 level or higher due to the large size of the sample.) The Pd scale relates to attitudes of unconcern about others, with a failure to benefit from experience and a disdain for rules and regulations. A high Ma score may indicate people who value effort and movement for their own sake, who pay little attention to social consequences of their actions, and who may have accidents. The very low relationships that were found led the authors to doubt their practical usefulness, concluding that there may be a number of personality patterns related to poor driving rather than a single one.

Several papers summarising research in this field have been published, including one by Goldstein (1961). He reviewed a large number of studies which correlated predictor variables (such as psychological tests and biographical data) with criteria measures of performance and several of these have been reviewed earlier in this chapter. Among other interesting studies he reports was one by Cobb (1939) on "general drivers" in Connecticut, USA: level of education was negatively related to number of accidents per year (r=-.19, p=0.05). Lauer et al (1952) also used education and aptitude, this time with army drivers. The best predictors of performance (based on ratings by supervisors and associates) were general intelligence (r=.19), mechanical aptitude (r=.23) and driving know-how (r=.28). These were all significant at the p=.05 level, and obtained on a sample of 331 drivers. When repeated on smaller samples only general intelligence was significantly related.

Much has been written about personality and attitudinal variables. In addition to the studies reviewed in their own right earlier, Goldstein reports that Cobb (1939) found that "attitude towards traffic" was significantly correlated with accidents (r=.08) but that attitudes towards society, and to risks and annoyances were not. [There was much research into "attitudes" in the 1950s and 1960s, particularly in the USA, not just on drivers but in other areas as well. "Attitude towards traffic" was not defined anywhere in the paper, though presumably it refers to attitudes towards, and concern for, other road users.] Conger et al (1956), on several small samples of airmen in Colorado, found no significant relationship between both the MMPI and the seven Thurstone Temparament Scales, and driving accident level. A number of studies focussed on the relationship of age with accidents, several of them being the result of US Government research in the 1930s. There was general agreement that young drivers have the highest rates, but less agreement as to what constitutes a "young driver". Three of the government studies classify this as being under 30; on the other hand Lauer's (1952) study of general drivers puts the worst group as 18-23 years and Tillman's (1943) research into Canadian bus drivers classifies it as 20-24. De Silva, (1938) is one of the few to mention that accident rates were higher for both young drivers (17-29) and for old drivers (50 years and over). Young drivers lacked experience, domestic responsibilities and tended to drive faster and more recklessly. Older drivers also had a higher accident rate on account of age slowing down reaction and motor co-ordination; in addition, they had learned at a time when there was less traffic, cars were capable of less speed, and formal tests were often not required.

Another general theme underlying much of what has been discussed above is that of "accident proneness". This is the idea that certain individuals' personality characteristics cause them to be involved in more accidents than might be expected by chance. This includes accidents at work, in the house and whilst driving, the last of which is included here. Reviews of research in this field include those by Johnson (1946), Craske (1968) and Reason (1974), the latter referring to research by Quenault on "dissociated" drivers. These tend to be more accident-prone and are characterised by lack of regard for information relevant to driving (such as use of mirrors, taking notice of junctions and roundabouts and judgement in summing up traffic conditions ahead). Such drivers tended to be unconcerned when near-accidents occurred.

An earlier study was by Tillman and Hobbs (1949) who studied bus drivers in Ontario, Canada and found that 10% of drivers had 25% of accidents. They carried out further research into taxi drivers, by means of interviews and found clear differences between groups of high and low accident drivers. The "personality characteristics" (based on these interviews) of the high accident group included unstable family background, frequent short-term employment, police record, disregard for the wishes of others and an aggressive and impulsive driving style. The low accident group, by contrast, had the opposite of those characteristics, with a tolerant, cautious and considerate nature. The authors recommended, therefore, studying the person's background and personality as a means of reliably deciding on whether they would be accident-prone or not. They did not feel, however, that the psycho-physical tests referred to in the studies above were able to differentiate on accident-proneness.

3.4 Summary and conclusions from published research

Some remarks can be made to summarise the published studies on drivers, in particular those that have some relevance to the present research. There is a long history of using psychological tests of one form or another to study or select drivers, both in the public transport field (tramcar drivers, bus drivers and conductors, and even taxi drivers) and in other areas such as lorry driving. In the early decades of this century the tests were mechanical in nature (such as the Viteles Motorman Selection Test), requiring elaborate equipment with its attendant capital and labour costs. In the 1930s and 1940s paper-and-pencil tests became increasingly popular, measuring not only intelligence and personality, but speed of reaction as well (as was the case in Ghiselli's research). The 1960s forward to the present have seen a variety of studies, both qualitative and quantitative, but without the strong central theme that was found especially in the 1930s. In addition to personality and intelligence tests, items of biographical data have also been used as predictors in studying driver performance.

The criteria of performance against which these measures have been tested include both subjective standards (such as supervisors' ratings) and objective ones (especially accidents, but including pass/fail at the PSV test (Brown) and work records (Heron). In some of the studies the correlations obtained have been statistically significant, although in most cases they were fairly low. There is some evidence, however, that age and accident rates are linked, for example, and that personality factors bear some relationship to performance. A number of studies were also particularly useful for their methods of classifying criterion data and are referred to again in the next chapter: research methodology.

CHAPTER FOUR

RESEARCH METHODOLOGY

4.1 Introduction

This chapter discusses both the theories underlying the structure of the research and the actual methodology involved in conducting it. This latter part looks at the methods used to select the sample of drivers for the research and its characteristics. The data collection methods are discussed in some detail - the tests and the measures of "performance" used - along with the rationale for each. Finally, the statistical methods used to analyse the data are described as a prelude to the next chapters where the findings are presented.

4.2 Theories underlying the research.

There are three major sets of theories which underlie this research and help explain why it has taken the structure it has. The first follows closely the work of R.B. Cattell, in his Handbook of Multivariate Experimental Psychology (1966). Cattell expresses dissatisfaction with the strict experimental, scientific methods of research, (exemplified by what he terms the Wundt-Pavlov bivariate approach) and proposes his own more flexible and adaptable procedure, taking after the multivariate approach of what he calls the Galton-

Spearman tradition. This has the advantage of

> attempting to bring into a single experimental field of reference all the variables necessary to detect and define the concepts that need to be employed for scientific understanding and without which it may not be possible to arrive at any lawful relationship. By contrast, the bivariate experimentalist often starts out with such a meaningless fragment of the totality that it is impossible to encompass any lawful relation or construe the conceptual sentence.
> (Cattell, 1966a, p.12)

The traditional, "hypothetical-deductive" method involves taking a hypothesis right at the start, fully-developed and finished, and testing it against facts derived from experiment. This has several shortcomings, one being that it does not teach students anything about research as an exploratory process, generating hypotheses from experiment. Furthermore, it is considered to be restrictive, giving the impression that a single hypothesis can be established on the basis of a single measurement difference, referring to a single cause. Instead, it is felt that the researcher should keep an open mind - there may at first be several plausible hypotheses, several sources of variance, and possibly multiple causes.

The alternative method proposed is exploratory in nature, and does not focus on one, sharply-defined hypothesis tested by a single experiment. In fact, as Cattell says,

> Research need not begin with a hypothesis at all, and in its true life setting, a finished hypothesis is rarely the real germinal point of research action. It can begin by noticing a curious and intriguing regularity ....
> (Cattell, 1966a, p.13)

In essence, this involves looking at the world to see what is there, drawing hypotheses out of the findings, checking them against facts, and making adjustments as necessary. This is "inspired exploration", with an initial hypothesis that might be nothing more than a desire to find out about something. This differs very much from the traditional approach, in that,

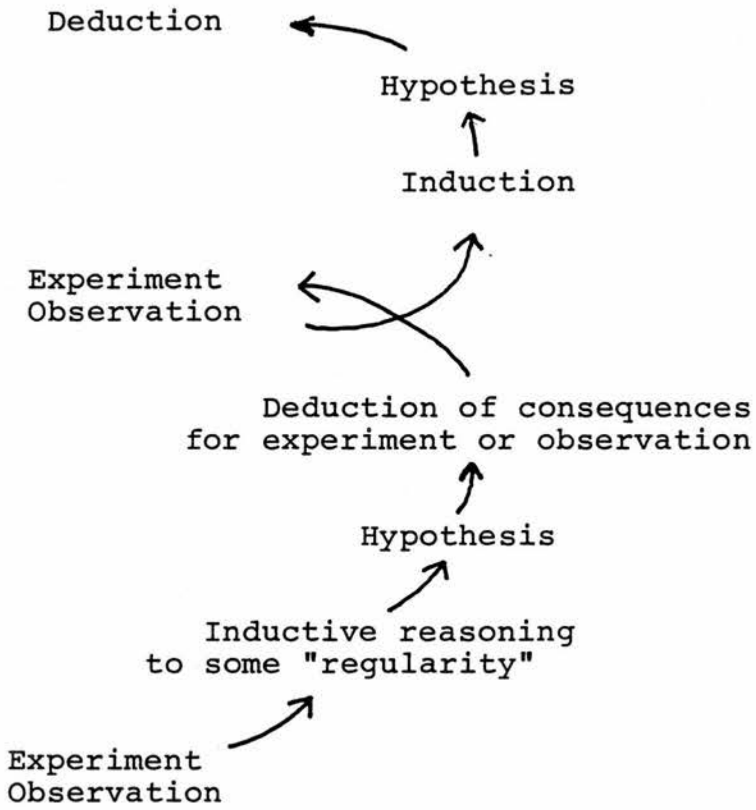
> Advance begins with dim, fleeting and far-flung hypotheses, gleaned from the faint movement of straws in the wind. . . . The hypothesis spirals out of the dust of many observations, and it is checked and tried many times. There is rarely a one-step, final confirmation of the hypothesis. (Cattell, 1966a, p.14)

There may be a large number of hypotheses to start with, each of which is checked against the data, and either discarded or developed further. The image of the spiral, used in the above quotation, is also used in a diagrammatical portrayal of this, the "inductive-hypothetico-deductive" method, shown in figure 4.1 below.

This research project in essence follows this model and is primarily concerned with the first two or three stages of the spiral. "Observation" of the bus drivers is made by the use of psychological tests and collection of performance data. From the analysis of this data, inductive reasoning enables hypotheses to be formed and suggestions made about the determinants of driver performance.

Figure 4.1

The Cattell "inductive-hypothetico-deductive" spiral.



(Cattell, 1966a, p.16)

The second theory underlying the research is one of personality. There are two broad schools of thought encountered in the study of personality, as discussed, for example, by Mehrabian (1968). The first is the cognitive-developmental approach. It regards individuals as being like an "amoeba", growing and developing a unique shape over time through a continual process of adapting to changing environments. The second school of thought, known as the instinct-need-habit-trait-factor theory, believes that peoples' patterns of behaviour are relatively stable and persisting over time, changing only gradually and in response to continual demands for change. This is popularly called the "inertia" model, and is the one underlying this research. The personality test used, for example, takes a standardised measure of behaviour. The scores obtained should not differ too much from those that might have been obtained a few years' previously. Similarly, the collection of performance data for a four year period, for example, should be a reasonably typical sample of a driver's behaviour.

The other main theoretical area which influenced the structure of this research is that of the "systems" approach to industrial behaviour. One of the major papers on this was written by Randell (1966) and the theories embodied in his PhD thesis (1972). The paper discusses the problems of measurement and prediction of human behaviour in the field of applied psychology, in particular those concerned with criteria of work performance. Randell summarises the problem by saying that applied psychologists "have to work with numerous overlapping criteria that are dependent upon many interrelated variables which are acted upon by various interdependent treatments" (p 116). The questions that the systems approach seeks to answer are "how can the subject be best considered in terms of meaningful and useful variables and groups of variables? and "how are these variables interrelated?" (Randell, 1966, p 116).

He discusses various previous studies which have been made using a systems approach, both within the field of industrial psychology (the work of the Tavistock Institue in the early 1960s, for example - Rice's (1963) work in Indian calico mills and Trist et al's (1963) study of the "long wall" coal mining methods) and outwith, for example in biology and child psychology.

Randell takes the concept further by seeking a system which enables more precise empirical description of the subjects being studied and which can be used for prediction or control of behaviour. He adds,

> If possible it should allow for the application of theories, or at least throw up hypotheses about them that can be tested. It should not be bound to any particular theory, or way of explaining behaviour in industry. (p 118)

The system put forward provides a means of interrelating all the variables available, by studying the inputs, treatments and outputs. The inputs are the workers' aptitudes and behaviour (measured, for example, by questionnaires and psychological tests), which progress through the system in a number of stages (termed "systems constants") being transformed by treatments (such as training and the working environment) and result in outputs (for example, goods produced, items sold, accidents, job turnover). There are several conditions for this. The system should be predictive in that it can provide an indication of those inputs and treatments which determine particular performances. The variables should also be capable of measurement at the interval level, and further, it must be possible for a causal relationship to be established between inputs and treatments on the one hand to outputs on the other.

Various constraints are imposed on the system by the environment - these are groups of variables which can influence the outcomes and interact with other system varaibles, but are outwith the influence of the occupational psychologist. Examples of these include economic conditions (changes in supplies of raw materials, consumer demands and tastes, etc), changes in work traditions (changes in entry/training requirements), new types of machinery and technology (for example, the move from manual typewriters to electronic word processors) - all of which may alter work performance.

The systems approach can be related to the current research, in the following way. The "inputs" are the scores from the psychological tests, which provide measures of the bus drivers' aptitudes and potential behaviour. The "treatment" will be the conditions and environment at individual bus depots (such as the number of drivers employed) and the "outputs" are the measures of work performance, most of which are negative in the sense that they relate to things done wrongly, such as accidents, disciplinery offences and attendance data. Constraints outwith the control of the researcher might include the differing levels of traffic faced by drivers (both by time of day and by location of depot -

urban/rural), the reorganisation of the Scottish Bus Group (which took place during the period of the research), the move by some companies to introduce minibuses and to return to using conductors, and the changeover from mechanical to electronic ticket machines.

The value of using the systems approach in a study of the determinants of worker perfromance is well summed-up in this quotation from Randell (1972):

> The worth of the systems approach to industrial behaviour can only be demonstrated by the fruitfulness of the understanding that it generates and the progress it brings about in explaining and predicting worker behaviour. (p 47)

4.3 Research design

Some consideration is now given to the research design appropriate to this project. Research design can be defined as "the plan, structure and strategy of investigation conceived so as to obtain answers to research questions and to control variance" (Kerlinger, 1973, p 300). As this project is concerned with observing and studying people at work, it does not fall neatly into any of the categories put forward by writers such as Campbell and Stanley (1963). They refer to "experimental" and "quasi-experimental" designs, often used to study the effect on a dependent variable of a change in an independent variable, with outside influences being held constant or at least being fully measured. This is in line with the traditional approach disapproved of by Cattell (1966a).

This research, by contrast, falls into the "ex post facto" category, regarded by some as being deficient and inadequate (eg, Kerlinger, 1973). In effect, it studies something done or occuring after an event as the following definition shows:

> Ex post facto research is systematic inquiry in which the scientist does not have direct control of independent variables because their manifestations have already occurred or because they are inherently not manipulable. Inferences about relations among variables are made, without direct intervention, from concomitant variation of independent and dependent variables (Kerlinger, 1973, p379).

The most important difference between this type of research and the more conventional experimentally based type, therefore, is a lack of control over independent variables. Subjects cannot be assigned to groups at random, nor can controlled experimental manipulation be applied to them. The researcher can only observe the dependent variable and then investigate the independent variables for their possible effects on the dependent one. The danger of this lack of control is that it can lead to misleading or even false interpretations based on research results carried out under this system. Even if a hypothesis is being tested (not always the case in this type of research) the results could still be weak in that they may capitalise on chance relations. Seemingly plausible explanations may merely be a case of making the interpretation fit the facts (Merton, 1949, quoted

Kerlinger, 1973). This is an important criticism which should be kept in mind.

Much ex-post facto research does take place, however, "simply because many research problems in the social sciences and education do not lend themselves to experimental inquiry" (Kerlinger, p 391-2) In many cases, the important independent variables cannot be manipulated - in this research, for example, the personality and intelligence of bus drivers - and all that can be done is to adopt an approach that is non-experimental in the traditional sense of the term.

This leads back to Cattell's work on research design. He adopts a much wider definition of an experiment, namely as

> . . . a recording of observations, quantitative or qualitative, made by defined and recorded operations and in defined conditions, followed by examination of the data, by appropraite statsitical and mathematical rules, for the existance of significant relations (p 20)

He avoids specific mention of terms such as "under controlled conditions" and "manipulation", preferring to include observation and measurement of both naturally occurring events and those taking place within a laboratory environment. He puts forward a scheme for classifying research design along six bipolar dimensions, which in combination make a total of 29 feasible patterns. The appropriate ones for this research are

(code 9) m f d u a n

(code 14) m f s u a n

The first letter in each refers to the number of variables included in the research, in this case "m" for multivariate, as this research is studying many variables at the one time. The second letter refers to the presence or absence of manipulation of variables by the researcher, in this case they are freely happening ("f"). The third item is the presence or absence of a time sequence between measurement. In this case, both alternatives have been included - "d" for dated and "s" for simultaneous - as performance data was collected relating both to the time at which the tests were administered to the drivers and to prior and subsequent performance.

The fourth dimension is concerned with the degree of control over unmeasured (environmental) variables - in this case the choice is "u" for uncontrolled. It was not possible to control unmeasured variables in this research, as it was concerned with investigating performance of people at work. Such environmental variables might include those relating to the characteristics of population in the areas studied, the nature of the road system, traffic flows and density. It would have been a major task to measure these, if no statistics existed, and almost impossible to hold them constant in an experiment. The fifth dimension refers to the choice of variables, in this case an abstractive ("a") selection of those which might be used to explain relationships amongst the data. The final category relates to the representativeness of the survey population, in this research normal and unselected within the parameters. [It is biased in the sense that only bus drivers in the Scottish Bus Group are the subject of the research; within that population, however, a representative sample was taken.]

4.4 Selection of the sample

In order to build up the picture of bus drivers, and to attempt to ascertain the determinants of their performance, a sample of those employed by the Scottish Bus Group was taken. A sample was necessary owing to the large size of the population (in this case, around 5,000 drivers) and this was chosen by the Group. It was decided to collect data on (ideally) all the drivers in selected depots, chosen on the basis of two depots from each of the seven original companies. This enabled the sample to be fairly representative in several respects. By seeking data on all the drivers in particular depots, it was hoped that a wide range of driver "types" would be sampled. This would enable the variations on a number of variables to be studied, including age, service, accident and discipline records, as well as differences on the intelligence and personality tests. Taking two depots from each company enabled the sample to be well spread geographically, and the use of one official at Group headquarters level ensured that the sample contained a reasonable balance between rural and urban areas.

Table 4.1 below shows that, to a large extent, the sample of depots was representative. The depots were well spread geographically, from Thurso in the north, to Hawick in the south, and ranged in size from some of the smallest in the Group to the largest (Edinburgh, with 235 drivers). There was also a reasonable mix between areas. Fort William and Elgin represent fairly rural parts of Scotland, Alloa and Cumnock are small towns in industrial areas, and Paisley, Hamilton, Wishaw and Edinburgh are all in large urban areas.

Most depots operated a range of services, from local town routes to long-distance express work to large cities in both Scotland and England. Although some of the large depots operated quite substantial amounts of the latter (Edinburgh, for example, and Paisley, to a lesser extent), some of the smaller ones also provided such services. Examples of these include Elgin (on the Aberdeen-Inverness route) and Fort William (to both Inverness and Glasgow). All depots offered private hire facilities; only a few operated day and extended tours. Edinburgh was the main depot for the latter, with some also being operated by Cumnock and Paisley. A number carried out fairly substantial numbers of contract services, often for local schools, factories and coal mines. Alloa and Cumnock were examples of the latter. Much of the initial data collection took place during the 1984/85 miners' strike, and both depots were suffering financially from the loss of contract work. At Cumnock, this was an exaccerbation of events in recent years: the Ayrshire coal industry was very much in decline with very few pits remaining open.

Table 4.1

The sample of bus depots used in the research

Company	Number of Depots	Number of Drivers	Av size of depot	Sample depots	Size	
Central	5	887	177	Hamilton	177	
				Wishaw	180	
				Total	357	(40%)*
Eastern	14	974	70	Edinburgh	235	
				Hawick	20	
				Total	255	(26%)*
Fife	6	450	75	Cowdenbeath	87	
				St Andrews	34	
				Total	121	(27%)*
Highland	8	238	30	Fort William	23	
				Thurso/Wick	50	
				Total	73	(31%)*
Midland	14	845	60	Alloa	42	
				Larbert	100	
				Stepps	100	
				Total	242	(29%)*
Northern	10	443	44	Elgin/Forres	58	
				Peterhead/ Fraserburgh	50	
				Total	108	(24%)*
Western	12	1229	102	Cumnock	66	
				Paisley	146	
				Total	212	(17%)*
Total	69	5066	73		1368	= 27%*

Source: Information provided by the Scottish Bus Group. Figures for number of depots does not include sub-depots.
* = percentage of company's drivers in sample

One possible criticism is that all the depots north of the central belt were fairly small, and that a large depot such as Aberdeen or Inverness might have been included. The table quotes the average size of depot, which is somewhat misleading as some of the companies have both very large and very small establishments. Western Scottish, for example, in its original form consisted of both the large depots on the south side of the Clyde (such as Johnstone, Inchinnan and Greenock) and fairly small depots in Kirkcudbrightshire and Dumfriesshire (such as Annan, Lockerbie and Stranraer). On the other hand Central Scottish is perhaps the easiest to obtain an average size of depot from, as all its five establishments contain between 170 and 180 drivers. Mention has been made in previous chapters of the organisational changes which have taken place within the Scottish Bus Group. Four new stage carriage companies were created, resulting in a number of depots coming under new ownership. Several other depots (often near company boundaries) changed hands: Airdrie, for example, was transferred to Central from Eastern.

Table 4.2 below shows how the sample depots are allocated among the present eleven companies. (These changes were not announced until over a year after the sample was chosen, and after much of the data had been collected.)

Table 4.2

Sample depots in relation to the new SBG companies.

New Company	Depot(s) in sample
Central	Hamilton Wishaw
Clydeside	Paisley
Eastern	New Street
Fife	Cowdenbeath St Andrews
Highland	Fort William Thurso/Wick
Kelvin	Stepps
Lowland	Hawick
Midland	Alloa Larbert
Northern	Elgin/Forres Peterhead/Fraserburgh
Strathtay	None
Western	Cumnock

Fortunately from the viewpoint of representativeness, all but one of the present eleven companies have at least one depot in the sample, the exception being Strathtay which took over the southern part of Northern and the Perthshire operations of Midland.

4.5 Data collection methods: Introduction

The collection of data on the bus drivers in the sample took place in two stages. The first involved giving each driver a battery of three psychological tests; the second required making return visits to the depots to collect background data and performance measures. In most cases the second stage took place around a year after the first, enabling the researcher to see what had happened to each driver in the interim, in terms of whether they were still employed, had resigned or had been dismissed. The data collected can be divided into two categories - predictor variables (psychological test scores and background data) and criterion measures of performance.

4.6 Predictor variables (i): the psychological tests

Three psychometric tests of individual differences were used to obtain psychological data on each bus driver in the sample depots. These were all written, scored questionnaires, taken on a group basis, in sessions which lasted approximately one-and-a-half to two hours. Two of the tests were measures of ability/intelligence, the third of personality.

4.6.1 Rationale for the tests

Comment can be made briefly as to why psychological tests were used to gather data. To some extent the situation in which the research took place dictated their use. Access was allowed to over one thousand drivers, but for only up to two hours with each. In addition, the budget was limited to some extent, in that it would not have been possible to employ a large team of interviewers, for example. Tests such as the ones used were an economical way of collecting a fairly comprehensive amount of psychological data on a large group in the time available. Psychological tests often play a large part in recruitment and selection procedures (particularly in large companies and public bodies such as the UK Civil Service) as well as in counselling and clinical psychology fields. However, they also have an important role to play in research, as Anastasi notes:

> Nearly all problems in differential psychology, for example, require testing procedures as a means of gathering data. As illustrations, reference may be made to studies on the nature and extent of individual differences, the organization of psychological traits, the measurement of group differences, and the identification of biological and cultural factors associated with behavioral differences.

She adds that,

> For all such areas of research - and for many others - the precise measurement of individual differences made possible by well-constructed tests is an essential prerequisite.
> (both Anastasi, 1982, p.4)

In reviewing his research using tests on selection of salesmen, Randell also recomments their use,

> ... standardised tests and scorable questionnaires can play a crucial part in revealing the basic information concerning the individuals making up an organisation.
> (Randell in Miller (ed), 1975)

Tests have the advantage of being standardised measuring instruments. They are taken under the same conditions by everyone, in terms of printed booklets and answer sheets, verbal and written instructions and time limits. They are scored objectively, producing numerical scores (often at the interval or ratio level) which can be statistically analysed and "normed", so that different groups can be compared with each other, or against a general population.

Kline (1983) suggests a number of other ways in which data, particularly personality data, could have been collected. These include interviews, rating scales (of the form which Cattell used in the development of his personality theories and questionnaires), behavioural observations and repertory grids. These all tend either to have low reliability and validity (such as the interview or rating scales) or are more suited to an experimental or clinical environment, or to a small number of people. The latter can also be said of the forms of psychological tests other than personality questionnaires, namely objective tests and projective tests. Objective tests are those where the true purpose of them is hidden from subjects therefore making them less subject to distortion by "socially desirable" or other forms of response sets. However, Kline reports that there is little evidence of validity for them, and that they may often require special laboratories for their administration. Examples include the "fidgetometer" (a special chair which records all movements a person makes) and the "slow line drawing test". Projective tests (such as the Rorschach Inkblot Test and the Thematic Apperception Test) require subjects to give responses to ambiguous shapes or pictures. They also tend to have low reliability and validity, require an experienced clinical psychologist to analyse the responses, and are more suitable for a clinical or laboratory environment.

Anastasi (1982) discusses some of the advantages and disadvantages of using group tests. One positive feature is that they can be simultaneously administered to a large number of subjects. There is no need for a one-to-one relationship between tester and testee as these tests use printed questionnaires needing simple responses that can be recorded on an answer sheet. They are fairly straightforward, therefore, both to administer (requiring the ability to read out instructions and keep accurate time) and to score (using either a computer or a special stencil), with the question books being used over and over again. Group tests also tend to provide better established norms than individual tests, as data can be easily obtained on very large samples during the standardisation process. Over 2,200 took part in the British Standardisation of the 16PF, for example, conducted by Saville in the early 1970s (Saville, 1972, p.14).

One of the drawbacks of group tests is that there is less chance for the administrator to establish rapport, obtain co-operation and maintain the interest of his subjects. It is perhaps less easy to detect individual worries, anxieties or tiredness than on a one-to-one basis. In this research every attempt was made to establish and maintain rapport with the drivers. The administrators would talk to them at the beginning and end of the session, and also between tests, to try to make the situation less artificial and formal than it might have appeared to be. Inevitably, this was easier with the smaller groups than with the larger ones. On some occasions a qualified psychologist was available to give feedback to individual drivers on their test performance: the accuracy of this tended to leave the drivers concerned with a much more favourable impression of the research project than they might otherwise have had, and helped to restore a public relations advantage. Little attempt was made to control for the latter point made above, in that no note was taken of whether drivers were unduly worried about the tests, or the time they had started duty that day (as a possible measure of fatigue). However, overall a large number were tested, at different times of the day, so that those who were fatigued by coming at the end of a hard shift were counterbalanced by those who came fresh before the start of their work.

On an individual level each of the tests used contained examples which the subjects had to work through prior to starting the test. The administrators were careful to check that everyone had answered them correctly; if there were mistakes then the correct answers were explained fully to the drivers concerned. Fellow drivers were often able to express the reasoning behind the answers in a more-easily understood form than were the administrators, and this could help to reduce the tension. In addition, every attempt was made to reduce individuals' worries and fears about participating in the research, by promising that the test scores would be kept confidential from management (which they were) and that they would not be used against them in any way. There was no secrecy about individual results: drivers were invited to write direct to the University if they wished information about their own scores.

A more general criticism of group tests is that they may restrict an individual's responses, in particular with multiple choice items and where one has to pick the odd one out in a sequence or deduce similarities. As Anastasi notes, "One contention is that such items may penalise a brilliant and original thinker who sees unusual implications in the answers" and says later, "Some critics have focussed on the importance of analysing errors and inquiring into the reasons why an individual chooses a particular answer" (p.301). Group tests provide virtually no opportunity for a detailed examination of why people pick particular answers (especially if they are incorrect). However, to take the first point the drivers were encouraged (in the intelligence test) to pick the most straightforward or most obvious answer. On the Word Recognition Test (described later) the number of items answered incorrectly was taken into account on a separate score, although there was no analysis of which particular items were wrongly answered and why. The personality test involved selecting one answer from a choice of three; even when a subject felt that none of the answers applied to him, the instructions said that he had to choose one of them.

4.5.2 <u>The tests themselves:</u>

(i) <u>Word Recognition Test (WRT)</u>

The first test was developed at the University of Edinburgh by C C P Ingleton, and is still undergoing trial. (In part, this project was a testing ground for it.) It is designed to measure the ability termed "speed of closure", defined as "the facility with which individuals can apprehend the structural implications of a confused or incomplete visual configuration" (Mooney, 1951, p 1). In layman's terms it might be called being "quick on the uptake".

Mooney (1954) charts the development of the "closure" concept from its origins in Gestalt theory. Closure was one of the organising forces (along with similarity, proximity and good continuation) which determined the direction of perceptual organisation. As he says,

> The early "crucial" illustrations of these factors were given in simple visual patterns. In these, closure has a literal aptness in describing the closing of gaps in lines, circles, triangles and patterns. (p 51).

In a more general sense, Mooney defines closure as "the moment of perceptual resolution" and a "tension-relieving instant" when meaning is recognised in a complex pattern.

He considers it almost to be the opposite of insight, which is not rapid, requires careful consideration of a problem and often specialised knowledge to solve.

A number of psychological studies have attempted to measure this ability. Thurstone (1944) devised a "mutilated words test" (words with ink removed at random) to see how quickly subjects could identify the words, and was the first to use the phrase "speed of closure". Mooney (1954) himself devised a battery of six closure tests (including mutilated words and sentences, and incomplete drawings); in the subsequent factor analysis a "perceptual closure" factor emerged on which the mutilated words test was strongly loaded. Speed of closure is one of fifteen factors which can be measured by the "French Reference Kit" of tests (Ekstrom et al, 1976).

Various other pieces of research have referred to speed of closure. Examples of these are Ohnmacht et al (1970, 1972) who deleted words from prose passages and asked subjects to determine what they were. Adcock and Webberley (1971) used tests from the "French kit" and other sources (such as the IPAT "Culture Fair" and "16PF"); and Mos et al (1974) discovered it among eight factors derived from an eleven test battery of Gestalt type tests. More recent studies have included Platnick and Richards (1977) and Sparrow et al (1982), the latter using a test of perceptual speed of closure in a personnel selection study.

The Ingleton Word Recognition Test takes these ideas further, by seeking to apply them to personnel selection in commerce. The WRT requires people to identify partially-printed words. The words are not associated with one another, and in each case the ink has been ommitted in a random fashion. The words are all those which might be found in "popular" newspapers (they are everyday words which a person with average range of vocabulary will be acquainted with) and there are no trick words (ie, random collections of letters not forming recognisable words). In general, it is felt that those who recognise a large number of words correctly are quick to identify and react to real-life situations. For bus drivers, this might be the ability to cope with dangerous and heavy traffic, or to deal with a queue of passengers effectively. The construct "speed of closure" has a number of characteristics, according to Ingleton (1986). It is not influenced by experience people have had in particular situations, nor is it directly related to academic achievement. It may however be linked with general intelligence ('g'- see below). Ingleton also states that "it is an ability that is either present or absent in a person. It cannot be acquired over time and it can be easily measured" (p.1).

The number of words wrongly identified constitutes the person's risk-taking tendency, although this is at present still at more of an experimental stage. Those taking the test are told not to guess words they do not know: it is felt that those who "see" words which are not there are likely to take more risks in life than the average person. These will be "errors of commission", doing things that one is not supposed to do such as issuing a ticket for the wrong fare or being involved in accidents. These can be contrasted with "errors of omission", not doing things that one is supposed to do. The WRT is still in its developmental stages, with various versions being available. That used in this research was "form A" (although it was not the first version). The little research evidence which is available appears to suggest that it has some validity in identifying the "better" performers among retail and sales staff (Ingleton, 1987).

The other two questionnaires are long-established and fairly well-known.

(ii) IPAT Culture-Fair test.

This produces a measure of "g" - general intelligence. The test has been developed from research which Cattell first started in the 1920s, following on from the work of Spearman and others who were concerned to investigate the nature and accurate measurement of intelligence. Spearman's two-factor theory underlies this test. He proposed that one possesses both general intelligence (the 'g' factor) which governs all one's activities, along with several specific types ('s' factors). These influence particular, individual activities. Anastasi (1982) highlights the importance of measuring an individual's 'g' with psychological tests:

> If this factor runs through all abilities, it furnishes the only basis for prediction of the individual's performance from one situation to another. It would be futile to measure specific factors, since each by definition generates in only a single activity. (p.366)

Cattell developed this further (as reported by Kline, 1976) into fluid ability ('gf') and crystallised ability ('gc'). The former refers to an individual's innate reasoning power whereas the latter is this reasoning power as it exists in a particular culture. The Culture Fair test is therefore a measure of 'gf'.

The first tests appeared in 1930, but it was not until 1949 that the present format appeared. Advances in electronic computing facilities permitted more advanced item analyses to be carried out, and the present version was first published in 1961. Scale 2 (form A), which was used in this research, is intended for children between the ages of 8 and 14, and for adults of average intelligence. Two other scales exist - Scale 1 is for children between 4 and 8 years old, Scale 3 is suitable for older children and adults of above-average intelligence, such as university and college students. The test has four sub-tests consisting entirely of drawings, requiring subjects to complete progressive series, find the odd one out, solve incomplete designs (matrices), and discover rules. Instructions are read out at the beginning of each test, but there are no words on either the test booklet or the answer sheet. This is intended to make the test as "culture fair" as possible, so it can produce a measure of intelligence irrespective of the cultural, social or educational background of the participants. There are two or three examples for subjects to practice on before taking each sub-test - each is fully explained, and if someone gets a wrong answer or fails to understand it, then the administrator has to show how the answer is derived. Within each subtest, the items get progressively more difficult. There is a time limit for each subtest. Norms are available enabling bus drivers to be compared with a general population.

This test was included to provide some overall measure of intelligence of the bus drivers. The intelligence quotient ("IQ") is popularly perceived as "the" measure of intelligence, but in academic circles it is not as popular as in the past (eg. Tyler and Walsh, 1979), and receives only passing reference in this study. It is calculated by dividing the person's mental age by his chronological age, and is suited for measuring the average growth in intelligence in children. IQ is not felt to be so appropriate for adults, however, as their mental growth lacks the predictable regularity it has in children. A standardised score is of much greater use: it is more meaningful to see how many standard deviations above or below average a person is, than to calculate "IQ".

(iii) The Sixteen Personality Factor questionnaire (16PF)

Cattell's personality questionnaire was the final test in the battery. The first version of the 16PF was published in 1949, after ten years of research, and there have been five major revisions since, the most recent editions being published in 1979. Cattell started by taking all the adjectives which could be used to describe people (over 4,000) and refined them by combining those with the same meaning. A large group of people were then rated by trained observers on the 171 surface traits which were left. After extensive statistical work using factor analysis Cattell reduced these to what he called his sixteen "primary source traits of personality". These were held to underlie the enduring aspects of human behaviour. The factors themselves are supposed to be relatively independent, not being correlated with each other to any significant degree. A score on one factor should not be influenced by a score on another, although there may be some weak correlations. Further analysis by Cattell produced eight "second-order" factors (underlying the primary ones), including anxiety and extroversion.

The test gives scores for fifteen bipolar personality factors, including reserved vs. outgoing, expedient vs. conscientious, shy vs. venturesome, and group-dependent vs. self-sufficient. The sixteenth scale measures intelligence. Five versions of the test are available: Forms A and B are the longest (each containing 187 questions) and require about 45 minutes to complete. Forms C and D each contain 105 items, taking around half-an-hour. These four versions are suitable for those over 16 years of age who have had a normal education. A fifth version, Form E, is available for those with well-below average reading ability. Form A (1979 edition) was used in this research.

The test is a self-report inventory, where respondents have to pick one answer from a choice of three, based on their "normal" behaviour. The following are two of the examples on which subjects practice prior to starting the test:

1. I like to watch team games

   (a) yes (b) occasionally (c) no

2. I prefer people who:

   (a) are reserved,
   (b) (are) in-between,
   (c) make friends quickly.

The test is scored by placing stencils over the answer sheet, and counting up marks as appropriate. Privacy is maintained, therefore, by not inspecting answers to individual questions (this is emphasised by the administrators at the start of the test). As with the Culture Fair test, norms are available to compare those taking the test with the general population. UK norms have been developed by Saville (1972).

A test of this nature has a number of potential problems, the first being that people might not tell the truth. This is more of a problem in personnel selection, where people could be tempted to lie in order to give a good impression. In this research the drivers were specifically told to give truthful, natural answers, as the researchers wished to obtain as accurate a picture as possible. Another difficulty is response sets - the tendency to give a certain type of answer regardless of the content of the question. These may include acquiescence (answering "yes", "agree", etc., to most items) and cautiousness (non-committal, neutral answers). Again, the drivers were asked to approach each question individually, and the administrators checked to see that no-one merely put crosses in boxes at random. They were also told to avoid using the middle, "average" answer in each case, unless it was impossible to chose one of the others.

Harder to control for were situations where, although people answered truthfully as they saw it, they had an unrealistic picture of themselves. Little could be done about this, except again encouraging them to take a realistic, natural viewpoint when approaching the questionnaire. They were told not to spend too much time thinking about each question - the first natural answer often being the most accurate. Indeed many of the questions are virtually unanswerable if one thinks for too long about them, provoking much self-debate about the kinds of people whom one prefers, for example. Despite the drawbacks of tests of this nature, Kline (1976) says that "impressively consistent and psychologically meaningful results have been obtained with these tests." (p.56)

An enormous amount of research has been carried out into the 16PF, both by Cattell and his team at the Institute of Personality and Ability Testing in the USA, and by other researchers testing and applying it. Buros, for example, quotes over 1,500 studies using it in his Eighth Mental Measurements Yearbook (1978, p.1077). In the first twenty years of its existence it was principally used for research; since the 1970s however, as Krug (1981) notes, its use has expanded into both the clinical and occupational psychology fields. In the latter, for example, it is frequently used as an aid to management selection, development and promotion; and in other exercises such as team-building, stress research and many aspects of counselling (Tyler, 1986). There is a clinical guide to its use (Karson and O'Dell, 1976); in addition there is a guide to interpreting profile patterns (Krug, 1981) and numerous studies have been published outlining profile patterns (and multiple regression equations) for specific occupational groups. Some of these from the USA appear in the Handbook (Cattell et al, 1982); some recent British ones have been outlined by Handyside (1986) and McKenna (1987), for example. The 16PF has been translated into many foreign languages and applied to many countries overseas, with the factors being found to apply in countries as diverse as Germany, Japan and Ghana (Kline, 1976). Without doubt, the 16PF is a very widely-used questionnaire both in research and applied settings.

This extensive application of the 16PF has produced much debate as to its usefulness, reliability and validity. This is such a large subject, with almost as many papers criticising the test (or aspects of it) as praising it, that only a few general points will be made here. There appears to be some agreement (eg, Anastasi, 1982; Bloxon, 1978) that reliability (on a test-retest basis), although fairly low, is satisfactory. There is more debate, however, as to whether items in each scale correlate higher with their own scale or with other scales (factorial homogeneity of items); similarly, over the extent to which scales are independent of each other (factorial independence of scales), as is discussed in Bolton (1978) for example. There is also controversy over whether an individual's personality can be reduced to a mere sixteen dimensions. The Handbook has been criticised by many (including Bloxom, 1978 and Walsh, 1978) as providing inadequate data on the construction of the test and on reliability and validity studies, and for being hard to understand.

The impression is gained, however, that despite its weaknesses, the test probably provides as good a measure of personality as can be obtained in an efficient manner. The following quotations illustrate this. The first are from Bolton:

> The scientific foundation of the 16PF is at least as solid as any of its major competitors.
>
> When evaluated by reasonable standards, the 16PF compares favourably with any other inventory that purports to measure variations in normal personality functioning.
>
> (both Bolton, 1978, p. 1080).

Kline is also praiseworthy of the test:

> So large a body of research has been carried out that, to a properly trained psychologist, the test variables are psychologically meaningful. Thus we know for each one what influences affect its development, what sort of people score high on a certain factor and what kinds of behaviour each factor is related to, as well as what other test varaibles are correlated with it.
>
> (Kline, 1976, p 67).

In discussing the test he acknowledges its weaknesses and says that it is far from perfect, being " fairly easy to distort if used for selection". These apart,

> . . . it is certainly one of the best and most practicable personality questionnaires.
>
> (Kline, 1976, p 70).

4.7 Predictor variables (ii): Background data

Background data on the drivers was also collected. This section reviews briefly some previous studies which have used this type of data, before discussing in more depth the actual measures collected and their classification.

Several studies in this field have used biographical data when measuring job performance, and this has been repeated in this research. Brown and Ghiselli, for example, in their 1947 study of motor coach operators looked at age, extent of education and marital status in addition to taking an intelligence test score. Similarly, in their 1949 study of accidents among taxi drivers they collected data on age, years of formal education, and years of driving both taxis and in general. Schuster and Guilford (1962) collected and used 24 biographical items in their Driver Attitude Survey - as well as those mentioned above, they included physical and mental health, race and number of employers in the previous two years.

A number of general items were collected, namely the year the driver was born, the year he/she commenced employment, and whether male or female. Some data on the circumstances in which the driver works were also noted to see if they had any influence on performance. These comprised the size of the depot (in terms of number of drivers employed) and the distance of the depot from the company head office.

The other source of background data was that obtainable from the job application form. The format varied between the different companies in the Group, but the information obtained was basically the same. A copy of one such version is given in the appendix. One drawback is that they may be incomplete: information may be incorrect or omitted (either because the person has forgotten or feels it might unfairly prejudice his application). A degree of caution has to be exercised with this data, therefore, as it is based on what the person has said he has done (although he has to sign a statement to say that everything he has written is true).

The information collected from the application form comprised the following. First were the types of driving licence held at the time of application - the number of years the driver has had a car licence, and whether he held Public Service Vehicle (PSV) or Heavy Goods Vehicle (HGV) licences as well. Next were the types of educational qualifications the person had obtained, both academic (school and college/university) and technical (such as "City and Guilds"). These were arranged into the following categories:-

- General certificates, such as "Third Year Leaving Certificate" which were awarded before the advent of "O" levels;
- "O" levels/grades;
- "Highers"/"A" levels;
- College diploma;
- College/University degree;
- Trade Certification (usually the result of an apprenticeship, often "City and Guilds" or equivalent);

The final category of data taken from application forms concerned previous employment, subdivided between that in a bus company and that elsewhere. Previous chapters have mentioned that turnover in the industry has been high (and continues to be so in areas such as Edinburgh); accordingly there is some movement between different types of operator (SBG, municipals and independents). The SBG trains all its drivers of full-size buses to hold

a category "A" PSV licence, which allows them to drive any type of bus, and accordingly makes them valuable to independent concerns who have neither the facilities nor the resources to train people themselves. The movement is not all one-way, however: there are a number of cases of drivers starting off with an SBG company, moving to an independent and then returning to their original company, perhaps because of the lower wage rates and lesser security of employment commonly found in the independent sector. This is especially the case in areas where there are a number of well-established independents: examples include Paisley (with McGill's of Barrhead and Graham's Bus Service being strong competitors for the SBG) and Wishaw (where Central Scottish compete with Hutcheson's of Overtown and Irvine's of Law).
Staff shortages in the past meant that many depots had to be less selective in their recruiting - if a person had a PSV licence and no serious convictions, they were almost certain of employment. Especially in the Central belt, there are many cases of drivers having one, two or more periods of previous employment with their firm. Unfortunately, there are also cases of drivers who were dismissed (some even for having breath smelling of alcohol) gaining re-employment.

The information pertaining to previous employment in a bus company was recorded as follows, in the form of "yes" or "no":

- own company: resigned of own accord;
- own company: dismissed from employment;
- worked for another company in the Scottish Bus Group;
- worked for a municipal operator, or one of the companies belonging to the National Bus Company;
- employed by an independent operator;

("own company" refers to his employer at the time the records were examined).

The other area related to previous employment outwith the bus industry. This was divided into 10 fairly common categories, and it was recorded (on a yes/no basis) whether the person had held a job in each. The following were the classifications used:

- manual unskilled: no qualifications and very little skill/experience needed; eg, labourer and dustman;
- manual semi-skilled: no qualifications necessary in many cases; some measure of training required plus an element of experience built up by doing the job. Includes production or machine operator, storeman, railway guard, brewery/distillery workers, etc.;
- manual skilled: qualifications usually required, often after serving a traditional apprenticeship (leading to "City and Guilds" or similar). Includes building trades (bricklayer, carpenter, plumber, electrician, painter and decorator), turner, blacksmith, baker, butcher, gardener, etc.;
- clerical: covers a range of clerical and secretarial tasks;
- managerial: refers to a fairly low level of management in most cases, but where there is some element of responsibility. Examples from the research include pub managers, shop branch managers, and foremen in a factory;
- "off-road" driving: where a formal licence to drive is not required as work takes place either inside a factory (eg forklift trucks) or off a public road, on building sites for example (drivers of cranes, bulldozers);

- "licensed" driving: occupations where certainly a normal licence and often a special licence are needed; includes delivery vans, taxis and heavy goods vehicles. There is some movement from both taxi and lorry driving to bus driving, often on account of the greater security of employment in the SBG and the lesser need for long-distance overnight journeys;

- selling: those who have worked in a commercial relationship with the public. Examples from this study have included barmen, milkmen, shop assistants, insurance collectors and sales representatives.

- HM Forces and Police: These tend to be favoured by those who recruit drivers, the logic being that as they are disciplined, well-dressed and take orders, they will make good employees;

- miscellaneous: anything not covered above, or where the person has just put the name of an organisation with no indication of the position held or type of work.

The final piece of data in this section was the number of jobs the person had held in the five years prior to his application - this included those of under 12 months' duration and previous employment in his own company (if applicable), but excluded periods of unemployment. The intention was to give some idea of permanence or commitment - between a person who had held a job for a considerable time, and someone who changed jobs fairly frequently.

4.8 Criterion variables

4.8.1 Introduction

Much has been written about the collection, use and types of performance data; appearing in specialised texts on the subject (such as Landy and Farr, 1983); in more general texts on industrial psychology (for example, Ghiselli and Brown, 1955; Guion, 1965; and Smith in Dunette (ed), 1976) and some theses (for example, Morrison (1981)). This category of data can be divided into judgemental and non-judgemental methods, with the former tending to be more popular.

According to Landy and Trumbo, three-quarters of published research studies used jud~~e~~gemental measures as the primary criterion variable. In essence, this method involves someone assessing another's performance (either on specific variables or in general) by giving a rating on a scale. These may be either verbal (from "very good" to "very poor", with various stages in-between) or numerical (for example, from one to five). Rating scales can either be criterion-referenced (where performance is evaluated against a set standard) or norm-referenced (where an individual's performance is compared with a group or other individuals). Despite attempts to increase the objectivity of ratings (such as the development of "Behaviourly Anchored Rating Scales", eg, Smith and Kendall, 1963) they remain subjective judgements based on personal estimates of others' performance, and this is one of their main drawbacks. Supervisors may, for example, see some of their employees in a better or worse light than others and rate their performance accordingly, irrespective of actual performance. Other supervisors may be unwilling to use the extremes at either end of the scale, or may consistently rate people either well or badly.

The other category of performance measures are those which are more objective and described as non-judgemental. Guion (1965) subdivided them into production and personnel data. The former comprise measures of output which can be easily counted and attributed to individuals. For factory workers, for example, these may include quantity or quality of units produced, scrap rate, bonuses earned, etc; for sales staff, volume or cash value of sales, commission level or profit on sales are possible inidices. An example of the latter is found in Randell (1972) for salesmen of gas appliances. Measures available included number of sales, mean value of sales, and days worked for each month over a three year period (Randell, 1972, p 73). Personnel data, on the other hand, do not represent performance directly but are often used in any definition of effectiveness. These may comprise absenteeism, turnover, grievances, accidents, job level/salary or promotions. It is mainly measures in this latter category which were used in this research, as bus drivers do not really "produce" anything. The revenue they collect is usually beyond their control (ie, they have little or no control over who travels where or when); and they may drive a number of different vehicles in a day, so it would be hard to monitor fuel consumption, wear and tear, etc.

4.8.2 The measures themselves: (i) Rationale

A system for classifying the performance data was established after an initial survey had been made of the sorts of data which were available. Reference was made to some of the published research studies referred to in the previous chapter which have used criterion measures. To some extent the classifications used in those studies have influenced the system produced for this project. Two papers in particular were useful for their categories of accident data. The first was Farmer and Chambers (1939) who used the following:

a) Driver not responsible

b) Driver responsible:

   i) Errors of judgement (eg, miscalculating the space between two parked cars or taking corners too sharply)

   ii) Over-runs (failing to stop in time and hitting the rear of a vehicle in front)

   iii) Skids (on wet or icy roads)

   iv) Miscellaneous

Ghiselli and Brown's study of motor coach operators was also useful in this respect:

a) Collisions - with pedestrians
   - with trolley cars
   - with motor vehicles

b) Non-collisions - boarding/alighting accidents
   - accidents aboard the vehicle

The author's research was not concerned solely with accidents, however, and two other studies were of benefit in defining criteria. Ghiselli and Brown (1955) report these ten measures used to assess the performance of "streetcar motormen" (tram drivers) in San Francisco:

1. Collisions with vehicles/pedestrians.
2. Traffic violations.
3. Commendations from the public.
4. Complaints from the public.
5. Number of times company rules broken.
6. Sleepovers.
7. Number of times schedules broken.
8. Reprimands from inspectors.
9. Ratings by inspectors.
10. Errors reported by dispatchers.

Heron's study of bus conductors in London was also useful for selecting criteria for the non-driving aspects of the job being studied, principally fare collection. He used five objective measures (taken for the first six months of the conductors' employment) and one rating:

1. Gross earnings.
2. Cash shortages.
3. Periods of absence.
4. Lateness for duty.
5. Disciplinery actions.
6. Rating - "source of concern to supervisors".

(ii) <u>Disciplinery action</u>

Based on these studies, and the material which was made available, the classification which follows was produced for the criterion measures. As a proxy for "performance", therefore, drivers' offence, accident and other records have been used, which in most cases were fairly comprehensive. All disciplinary interviews are recorded, whether action is taken or not, and all accidents that occur have to be reported, however trivial they may seem, on a standardised form which can then be sent to SMT Insurance if need be. In some depots copies of these forms were available; in others a card in the driver's record file gave a summary of each accident.

A disciplinary procedure is set out in the drivers' rule book, outlining the types of disciplinary action, the appeal procedure and stating that an offence can no longer be held against a driver after two years. This is the subject of an agreement between the Group and the Transport and General Workers' Union. The main categories of action are as follows:-

- informal warnings: given in cases where "an employee is in breach of normally accepted practices, or fails to achieve the required standard of performance" (p.63). Although the rule book says that no official record shall be kept of these, they tend to be recorded on a record card along with the reason.

- formal (written) warnings: issued if informal warnings fail to achieve the desired effect, or if there is a more serious breach of the rules. Copies are given to the driver concerned, often to his shop steward, and placed in his record file;

- suspension (without pay): for anything between one and seven days can be imposed if both the above fail to achieve any lasting improvement in the appropriate area, or if the offence is sufficiently serious enough. Seven or more days' notice of suspension is normally given to enable the driver's duties to be reallocated.

- final warning (written): that dismissal will follow if a particular offence is repeated, or if performance does not improve;

- dismissal: if a series of warnings fail to have the desired effect, or if, again, an offence is serious enough.

These categories of action are applied both to breaches of the rules and to accidents, although with the latter there are two additional categories. "Not at fault" is where the driver is totally blameless; "no action" refers to where the accident was the fault of the driver but it was so minor that it was not considered worth while taking action against him. There is, therefore, a hierarchy of punishments. Dismissal is not necessarily the end - in the research a number of cases were found of an employee (with his union) appealing against it successfully, and being reinstated. It was also found that "final warning" was often not the last action taken - some records contain several final warnings, with one driver receiving seven in the space of three years. A count was taken of the number of occurrences of each type of action, both for disciplinery offences and for accidents.

(iii) Offence records

Referred to as "defaulters' records" in some companies, these are based on breaches of the Bus Group rules. These may arise as a result of an inspector finding a fault when checking a bus (eg. a destination blind wrongly displayed, a passenger with a wrongly printed or priced ticket, or not keeping to schedule), a complaint by a member of the public (eg. that a bus failed to stop at a particular point) or an observation by a clerical employee of the company (eg. a wrongly-completed waybill, or "excessive" absenteeism). The headings under which it was decided to categorise these offences were decided upon from looking at the rule book and at the frequency with which each type of offence occurred. It was considered desirable to subdivide the offences (at least for the early stages of analysis) - as opposed to aggregating them - to see whether certain types of driver committed certain types of offence. For each driver offences were put into the following categories:-

- timekeeping: whilst driving, in particular being early or excessively late at particular points. Rule 26(a) states "The Driver is responsible for the bus leaving the terminus and all intermediate timing points at the appropriate time, and is responsible to regulate the speed of the vehicle that he does not arrive at any point en route ahead of time." (pp.21-22) If a driver is unduly delayed by traffic congestion, a delay report has to be submitted.

- fare charging and ticket issuing: charging the wrong fare for the journey (too much/too little), issuing a wrongly printed ticket or failing to issue one at all, not carrying emergency tickets, and not checking season tickets/passes correctly are all included in this section (covered by rule 22).

- failure to stop and uplift: both passengers and inspectors. As rule 27 states, "The failure of intending passengers to give a signal when standing at a stopping place will not be accepted as an excuse for failure to uplift the passengers, except at a request bus stop." (p.23)

- rudeness: also referred to as insolence or "attitude"; this can be to passengers (intending or actual), other road users and inspectors. Rule 7 puts in this category demeanour towards passengers (he must be "civil, courteous and obliging") arguments (which drivers should avoid, or if caught in them be tactful and take names and addresses of witnesses) and service to passengers (knowledge of services and tours). (p.6)

- general carelessness: a catch-all for a number of miscellaneous breaches of the regulations. Included here are failure to wear uniform correctly (rule 7(a)), displaying the wrong destination on the front of the bus (rule 19), failure to carry or return a duty board (rule 19(b)), illegible or wrongly-completed waybills, driving on the wrong route and breach of EEC rules on using a tachograph.

- quality of driving: often from a complaint or the observation of a company official. This includes excessive speed, dangerous driving with respect to other road users, and misuse of the vehicle, often connected with the gearbox.

- excessive absenteeism or lateness in reporting for duty: in some depots this was recorded on the discipline record (as opposed to general records of same) and appropriate action taken;

- excessive cash shortages: as with the above, where a specific entry was made for having an "excessive" difference between cash paid in and the total value of tickets sold, as recorded by the ticket machine;

- miscellaneous: anything not covered above (very few in this category);

- number of complaints: from members of the public. If the reason for the complaint was given on the record, it was also recorded as an entry under the appropriate category. For example, "Complaint - failure to uplift passenger at x": an entry would be made under both "failure to stop and uplift" and "complaint";

(iv) Accident records

A similar approach was taken in recording accidents. There is a comprehensive procedure which has to be followed when any accident occurs: "Every accident, however trivial, must be reported to the management by the drivers involved when they go off duty, and a report form completed." (Rule 32(m), p.27). Following Brown and Ghiselli (1947), the accidents were divided into collision and near-collision types, as follows:-

Collision accidents:

- collision with other road vehicles: (usually on public roads, but can include reversing into other buses in a bus station or depot);

- collision with pedestrians: (fairly rare, but from reading the records those that do occur tend to be mainly with drunks);

- collision with animals;

- collision with inanimate objects: (such as fences, walls, gateposts, pillars, lamp-posts and bus shelters; in the highlands this can include hitting packed snow on the roadside and the effects of skidding on ice).

Non-collision accidents:-

- boarding and alighting accidents: (people falling on the steps whilst boarding or alighting from a bus);

- accidents aboard the bus: (commonly referred to as "passenger injury" - often includes people being hurt (even slightly) when a bus has to brake suddenly, or falling off their seat when going round a sharp corner, or losing their balance if the bus starts off before they are seated).

- vandalism from outside: (commonly includes windows being smashed by bricks and lights being broken);

- vandalism from inside: (mostly seats being ripped and lights smashed, almost always by unruly school children);

- miscellaneous: covers anything else, mainly including windscreens being broken by stones flying up from the road.

(iv) Other indicators of performance

In some depots specific data relating to cash shortages and lateness/absence were available. A detailed record is kept of all cash shortages (ie, the difference between the value of tickets sold, as recorded by the ticket machine, and the cash paid in) so that they can be deducted from wages at the end of each week. As might be expected there is considerable variation between drivers in the extent and quantity of shortages, from those who have very few shortages (those that they do have being of small amounts) to those who are frequently in deficit (sometimes of large amounts). In the depots for which these figures were available, the number of weeks in which the driver was short was recorded; so that the data would be compatible between depots it was converted into the average number of weeks short per year.

Data was also made available, in some depots, on lateness in reporting for, and unauthorised absence from, work. Both can cause disruption to operations; each driver is allocated a "duty", which starts at a particular time. If he fails to appear at that time the control staff have to allocate another driver to his duty, using either spare men or those who have reported early. If alternative arrangements cannot be made in time, then a service may run late or even not at all. Absence is taken in the sense of unauthorised absence from work, and does not include scheduled rest days, paid holidays and sick leave. Both are recorded as an average number of days per year.

On the positive side, a number of drivers received letters of commendation; these were found most frequently at New Street depot, Edinburgh, which operates a large number of extended tours. A fairly close bond is often established between driver and passengers over maybe 5-7 days; some drivers obviously make such a good impression that the company receives letters praising them (and the drivers receive large tips).

Status of drivers was the final category; approximately a year after they had taken the psychological tests. In particular, this was included to see how many had left, and for what reason; also to see whether any were promoted.

The classification used was as follows:-

1. Still employed as a driver;

2. Still employed as a depot controller: "a driver who does not drive" except when there is a shortage and who spends most of his time in allocating drivers and vehicles to duties;

3. Shop steward;

4. Since resigned from the company: unfortunately, only very rarely were the actual reasons recorded;

5. Since retired or deceased;

6. Since dismissed and not reinstated: as with resignations the reasons were not always available either in writing or verbally from the appropriate Traffic Supervisor;

7. Since promoted. Depot Controllers and Inspectors are recruited from the ranks of drivers: some become Depot Controllers and then Inspectors if they are suitable; other drivers achieve direct promotion to Inspector.

A practical approach was taken to the collection of this data. The companies of the Scottish Bus Group fortunately keep fairly comprehensive records on each driver, and access was given to these. It was decided to record as much detail as possible about each driver. The records were divided into two main sections - "background" (such as age, previous employment and education) and "performance" (breaches of rules and accidents).

4.9 Data collection

4.9.1 Test administration

Test administration took place at various intervals between September 1984 and October 1985. The pattern was usually for the researchers to spend perhaps a week at a depot, testing most of the drivers who were available, then to return perhaps for a day or two on a few later occasions in an attempt to test the remaining drivers. As hours of work, rest days and holidays are staggered, the SBG advised the researchers that a few return visits would enable drivers who were not available on the first occasion to be given an opportunity to participate. Visits to the depots were always arranged in co-operation with local management so as to be made at times when it would be most convenient to see their drivers. The actual conditions in which the tests were conducted varied quite considerably. They ranged from a noisy, cramped entrance lobby (closed-off to the public), a "Portacabin" and a bus to a modern conference room, offices and a lecture room with refreshments laid on. A total of 670 drivers took part in the questionnaires, 49% of the original sample.

Drivers were tested in groups of between one and sixteen, with the session lasting around one-and-a-half to two hours. Figure 4.2 is an example of the format of a typical testing session.

The project had been approved at a national level between the SBG and the national negotiating committee of the TGWU. The latter agreed to recommend to all their members to take part - in particular they were interested in whether there was any evidence of stress.

Figure 4.2

A typical test session.

- drivers arrive and are welcomed by the administrator. Given a copy of the letter from the University if they had not already received one.

- brief introduction (5 minutes approximately):

  - who the administrator(s) is/are and where they are from
  - purpose of the research
  - confidentiality of results
  - opportunity for drivers to write in if they wish a brief summary of their scores

- opportunity for drivers to ask questions

- Word Recognition Test (12 minutes including introduction)

- Culture Fair test (20-25 minutes including instructions)

- 16PF (40-50 minutes); drivers leave when they are finished and are thanked for participating.

Participation in the testing was voluntary, though drivers who attended were paid two hours at the standard rate. Prior to testing taking place in each depot, a consultation meeting was held between the local management, shop stewards and the researchers. At such meetings, the project was explained and any queries dealt with. It was stressed that all the completed questionnaires, and analyses of results for individual drivers, would remain strictly confidential. Both the SBG and the trade union would receive a general report at the end of the project, and under no circumstances would individual scores be divulged to management. Prior to each driver taking the tests, he was given a letter from the researchers explaining the purpose of the project, giving examples of the questions asked in each test, and inviting him to write in if he/she wished a personal summary of his own results. 81 drivers did so.

4.9.2 Problems in obtaining participation

There was a wide variation between depots in the numbers of drivers who took part in the tests, despite the willingness of the researchers to make return visits.

Table 4.3

Participation rates for each depot

Depot	Total drivers	Drivers tested No	Drivers tested %	Days spent testing
Alloa	42	24	57	2
Cowdenbeath	87	0	0	0
Cumnock	66	46	70	8
Edinburgh	235	170	72	12
Elgin/Forres (1)	58	23	40	8
Fort William	23	15	65	2
Hamilton	177	139	78	7
Hawick	20	14	70	4
Larbert	100	10	10	1
Paisley	146	81	55	11
Peterhead/Fraserburgh (2)	50	36	72	6
St Andrews	34	0	0	0
Stepps	100	36	36	6
Thurso/Wick	50	9	18	4
Wishaw	180	67	37	6
TOTAL	1368	670	49	77

Notes (1) Turnout at Elgin was 17 out of 44 drivers (38%); at Forres it was 6 out of 12 drivers (50%).

(2) Turnout at Peterhead was 24 out of 39 (61%); at Fraserburgh all 11 drivers took part in the survey.

Table 4.3 above shows that turnout varied from just 10% of the drivers in one depot to over 70% in several, and that in Fife the project never got off the ground. In addition, the project had to be abandoned after just one day at Larbert.

Five main reasons may be advanced for the variations in turnout. The first appeared to be a general fear and suspicion of the project, despite assurances that it was not a device to give management reasons to dismiss drivers, and that all test scores would remain confidential. It was believed that participation was lower among older drivers (it may have been something alien to many of them) and those who may have lacked confidence in their own ability. A number of older drivers, in particular, commented that they had difficulty with the tests as it was maybe twenty or thirty years since they had left school, and were not in the habit of taking "exams" (as some of them referred to the tests). This is the same reaction as Farmer and Chambers (1939) found nearly fifty years prior.

There was also the experience of "Scotmap" two or three years previously. As discussed earlier, this large-scale review of all SBG services resulted, not only in more efficient rostering of vehicles and drivers, but also in some redundancies. In a number of depots there was a body of opinion which believed that the union officials had been tricked into agreeing to "Scotmap" and that this project was in similar vein.

The researcher found often quite hostile responses when he mentioned "Scotmap" in conversation, among both drivers and depot management (inspectors and traffic supervisors) alike, and frequently had to reassure people that this project was being carried out independently of both the Group and the Unions. As was discussed in earlier chapters drivers had found that duties revised after Scotmap allowed less time for breaks at either end of a journey, and felt that insufficient allowance was made for recovery time if a journey was delayed due to traffic congestion. Local management considered that they should have been consulted more when services were altered, as many of the new routes and timetables did not appear to be an accurate reflection of local travel demands and patterns, as they saw them.

A second reason for the differing levels of turnout was that the organisation of the project at depot level varied greatly. In some cases it appeared that management and/or union officials did not encourage sufficiently drivers to participate. An example of this was at Wishaw, where the DTS felt that all he needed to do was to post names of drivers and the times they were to appear, and leave it there. A more personal approach might have brought greater success, as would perhaps have been making smaller groups of drivers come at times more convenient to themselves. For example, a number of drivers were not keen to come to the depot two hours or more before their shift; similarly, drivers who finished their early shift at, for example, 14.00 hours were often unwilling to wait until 15.00 hours or so (when a group would be assembled to take the tests), despite the offer of extra money. [This problem was by no means confined to this depot.] The shop stewards at this depot appeared to give the project less support than some of their colleagues had done elsewhere: for some of the time they were preoccupied with union meetings and organising a "day of action".

This can be contrasted with depots in which there was a reasonably high turnout. In Hamilton, for example, the supervisor took the attitude that all drivers were to participate unless they had a very good reason for not doing so. After the first three days, when the drivers were booked to come at particular times, they took drivers as they came off shift along to the testing room. This was accompanied by encouraging remarks such as, "Just come in and answer a few questions", "You'll enjoy it", and, "People who have done this are doing well when they fill in their football coupons". This brought a lot of hard work for the researchers, with different drivers starting different tests at different times, but it worked well, and meant that a large number of drivers were seen. Similarly, in Fraserburgh the depot controller just assumed that all his drivers would take part in the survey, gave them little opportunity not to, and with the backing of the local shop steward, had no difficulty.

The offer of two hours' payment was not in places as strong an incentive as was thought initially. There were cases of depots where a significant proportion of the drivers were ill or absent, thus providing lucrative opportunities for overtime earnings. (The drivers taking the questionnaires were only paid the standard rate.) One such depot was Stepps, where despite apparently vigorous attempts being made to encourage drivers to take part, only 36% did so. A different situation was found in Thurso and Wick: a number of drivers had shares in crofts or family shops, and thus driving was not their only source of income. [During the research visit, in fact, one was dismissed for driving a taxi for his wife's firm - in strict contravention of the SBG rules.] In addition, the nature of services there meant that many duties involved maybe ten or eleven hours on duty, spread over the day (rather than the usual mixture of early/late shift) and accordingly drivers received above-average earnings. Many of those operating the contract services to the Dounreay nuclear establishment, for example, would maybe work a ten- or eleven-hour split shift. This might involve being on duty from 06.30 to 10.30 hours and 14.00 to 18.30 hours: in addition to being paid for eight and a half hours, there would also be a spreadover allowance for the time off-duty in the middle of the day.

These cases can be compared with depots such as Cumnock, where Scotmap revisions had not only reduced the number of duties (and therefore the number of drivers) but also cut many of them back to the basic 7 hours 48 minutes. [SBG Drivers are guaranteed a minimum 39 hour week, usually comprising five days of each 7 hours and 48 minutes.] Opportunities for overtime were scarce and therefore one extra two hours' payment, even just at standard time, was seen as an incentive by many of the drivers. 70% participated at this depot.

A fourth factor contributing to a poor response in some depots was a loss of interest in the project once the initial enthusiasm had worn off, despite the efforts of the researchers. This was something of a problem in Paisley, for example, where testing took place one or two days per week over five weeks. In some other depots, there was a gap of several weeks between the initial consultation meeting and the start of testing. By the time the testing did start, the project was no longer at the forefront of the minds of either union officials or depot management. This was especially the case at both Elgin/Forres and Thurso/Wick.

A final consideration in this section is that the project was sometimes the victim of circumstances outwith the control of the researchers. In some cases, this took the form of very poor relations between management and union, for example at Larbert where the project had to be abandoned after just one day. In addition, the local shop stewards at that time appeared to be opposed to anything recommended by their national negotiating committee, and this had casued a number of local disputes at the depot. They were extremely sceptical of the project, and it appeared that all they had done to inform their members about it was to place the following notice in the drivers' room.

> Drivers are reminded that the Edinburgh University driver research project is voluntary, and that any driver who does not wish to participate does not have to do so.

In Elgin, there had been a change in shop steward since the original consultation meeting, and the new one was regarded by management as being militant. He did not encourage any drivers to participate (some felt that he actively discouraged them) and never sat the tests himself. In both Elgin and Peterhead, the traffic supervisors were elderly and very near retirement, and neither put much effort into organising drivers for the project. In Wishaw, another reason for the low turnout may have been rivalry between Wishaw drivers and those from Carluke depot nearby which had been merged into Wishaw around eight or nine years previously. For a few years after the merger there remained separate duty sheets for the two groups. This rivalry appeared still to be present, not helped by the Area Manager and most of his inspectors coming from Carluke originally.

In one company, Fife, the project never commenced at all - one of the shop stewards' demands was for the overtime rate to be paid to all who participated. Not only did the Group object to this for fear of repercussions in the other companies, but the Company itself was under financial pressure due to the miners' strike. Subsequent attempts to restart negotiations did not succeed.

In not all depots did local circumstances appear to conspire against the project. In Edinburgh, for example, all seemed to be against the project. The Assistant Traffic Supervisor was under considerable pressure owing to promotion of his superior with no successor being appointed, continuing labour turnover of around 20% per year, drivers undergoing training for new ticket machines which were introduced whilst the research took place, lack of spare drivers with the start of the coach tours season, and consequently plentiful overtime opportunities. Remarkably, this depot had one of the highest participation rates.

A fear was that these factors may have resulted in an imperfect sample having been taken. Some areas were barely covered (eg, Fife, Falkirk, Caithness); and in some depots certain groups (such as the most anxious or the least intelligent), who could have made a significant difference to the results, may have been omitted. Subsequent analysis was able to determine whether major differences existed between those tested and not tested, as background and performance data were collected for all drivers at most depots.

4.9.3 Collection of data from depot records

The bulk of the personality tests had been administered by the summer of 1985, and discussions took place with the Group to decide from which depots the remaining data from records would be collected. Visits were made to a small depot (Hawick) to investigate what data was actually available, and this enabled the researcher to design a form to collect the data from the other depots.

By mutual agreement it was felt inappropriate to return to some of the depots. The small number of drivers tested at Thurso and Wick, combined with the great distance of these depots from Edinburgh, meant that no further data was collected there. Similarly, the small numbers seen at Larbert, combined with the industrial relations atmosphere there, resulted in that depot not being included. Stepps was also abandoned - there had been a low turnout, and in addition another depot from another company (Baillieston from Eastern) had been merged into it, resulting in great organisational problems which caused the resignation of the manager owing to illness.

Collection of background and performance data took place between October 1985 and March 1986, with attempts being made to leave a gap of approximately a year between testing and examination of records. The researcher carried out this task virtually single-handed, receiving some clerical assistance only at Edinburgh. Data was collected under the categories described in the previous sections. The following table summarises what was obtained from each depot. In the following sections, the reasons for the disparities and the problems involved with the collection of this data are discussed.

Table 4.4

Collection of background and performance data, by depot

Depot	App. Form (i)	Off. (ii)	Acc. (ii)	Cash Shorts (iii)	Absence/late (iii)
	Type of data				
Alloa	Most	6	6	DR	None
Cumnock	< 50%	6	4	6 mnths	None
Edinburgh	All	5	5	4 years	4 yrs
Elgin	Most	8	8	6 mnths	7 yrs
Forres	Most	8	8	6 mnths	None
Fort William	Most	6	6	None	None
Fraserburgh	Most	8	8	6 mnths	None
Hawick	Most	5	5	6 mnths	None
Hamilton	79-85	3	2	6 mnths	1 yr
Paisley	c.50%	6	6	DR	None
Peterhead	< 25%	8	8	6 mnths	None
Wishaw	79-85	5	2	6 mnths	4 yrs

Notes:

(i) Either proportion of those available for inspection ("most", "all" or a percentage) or the years for which they were available.
(ii) Number of years for which records inspected
(iii) Number of years/months for which records inspected; "DR" = only appeared in disciplinery record
"None" = no such records available for inspection

4.9.4 Problems with biographical and performance data

A few problems were encountered with this, one of which was that a full record of previous employment was not always available. The application form asks applicants to declare their last two employments; if they do not cover five years, then details of all of those that do. Some people were meticulous in filling in five previous jobs (which might have covered their whole working life to that time), others just put in those covering five years (or less). An additional problem was that, in some depots, drivers entering prior to c.1965-1970 had completed an older style of form, with less information on previous employment and the length of time a licence had been held, and no record of school and other educational qualifications. This was especially noticeable in depots where a higher-than-average proportion of drivers had long service, such as Cumnock.

An added complication was that, in not all depots, were all the application forms available. In the two Central Scottish depots, for example, all records of that nature were stored at the company's head office, where recently a new person had taken charge of them. He had decided to reorganise the filing and disposed of all those prior to 1979 (only a few months before permission was requested to see them). In some depots the storage of such forms was rather disorganised, and only a quarter to a half were able to be found. In others, however, meticulous records were kept and the bulk of such forms were available. In most cases it was possible to determine, from the driver's record card, whether he had previously been employed in that company and, if so, whether he had left voluntarily or not.

One of the major problems encountered with this data was that it did not all cover the same length of time. Drivers had differing lengths of service, from less than a year to over 30 years. Similarly, in some depots discipline and accident records were available for longer time periods than in others. The problem was how to make the records from each depot (and each driver) compatible with one another. It was decided that an average would be used: the number of years for which the records were taken was entered in the data file prior to both the discipline and the accident records. The computer program used divided each record by the appropriate number of years to give an annual average for each.

It appeared from collecting the performance data, that there were variations between depots in the way management treated offences and accidents. The action taken against drivers appeared to vary considerably, even within companies (comparing for Northern, for example, Elgin and Peterhead; Hamilton and Wishaw in Central), perhaps reflecting differing managerial approaches. Minor accidents for which a driver is responsible are a particular example of this : in some depots there was almost always a "no action" recorded, whilst in others a seemingly similar accident brought a "warning" or worse. Similarly with minor discipline offences - some areas appeared to have far more, on average, than others. Written and final warnings, and suspensions occurred far more often in some depots than others. In addition, there were variations in the way this information was recorded. In the two Central Scottish depots, blameworthy accidents were noted in the driver's record file, whereas those not to blame were all entered in a large book. At Cumnock all accidents were recorded in a book, with a symbol to indicate if the driver was at fault. In other depots (such as Paisley, Alloa, Fort William and those of Northern) a photocopy of every accident report was put in the driver's file, while at others (such as Edinburgh) there was just a summary sheet of accidents and action taken. Attempts were made to standardise this data when it was being recorded and coded for computer analysis.

Information tended to be recorded in differing ways between depots, cash shortages being one example. Each depot kept a record of whether a driver's takings were under or over what they should be (in Peterhead and Fraserburgh they were more often over than under), and at the end of the week the shortage was deducted from wages. In some of the larger depots in particular, the driver was given a disciplinary interview if his shortage exceeded a certain level, and this was recorded specifically on his record. In Alloa this took place where the shortage was over £1; in Wishaw and Paisley when it was in excess of £2; and in Hamilton if greater than £4. At Edinburgh and other depots very rarely were there specific interviews; rather if a driver was persistently short he would receive a general interview and reprimand, with words to the effect of "excessive cash shortages" being recorded but with no indication of what was "excessive".

Lateness and absence records were only available in some places, as were separate details of cash shortages, and the problems with availability of application forms have already been discussed. Fortunately most depots did not adhere too strongly to the two-year rule (after that time an offence cannot be held against a driver) - although records of more than two years were often scored out, they were usually still readable and able to be recorded. At Central a new style of record book had been introduced approximately five months prior to the researchers examining the records - at Wishaw all the old record cards had been placed into the books but at Hamilton very few had been put in (presumably only the more serious ones).

4.9.5 Types of data not collected

Mention can be made briefly of the sorts of data that might have been used, but were not. Rating scales (discussed earlier), either in their basic form or "behaviourally-anchored", are widely used in research of this nature. The SBG did not permit their use, however, mainly on the grounds of time. Not only would behaviourally-anchored scales have taken some time to establish, but the whole exercise of getting Traffic Supervisors and Inspectors to rate each driver would have taken too long. Salary levels were another possibility; however, all drivers (once qualified) are paid the same rate per hour as different grades do not exist. Gross earnings might have been used, as a reflection of the amount of overtime and extra days a driver was willing to work. (This was one of the criteria employed by Heron, 1954.) This is allocated on a seniority basis, however, and opportunities for it vary considerably between depots. Tachograph discs could have been a source of data, showing those drivers who exceed the speed limit or leave early or late. Not all drivers work long-distance services, though, and the discs (which exist in great quantity) require both time and skill to interpret properly.

Repeated attempts were made to obtain financial data from the Bus Group, each without success. Although it would be hard to assign everyday costs to individual drivers (such as fuel consumption, wear and tear) for the reasons already stated, it might have been useful to gain some data for depots as a whole. This could have taken the form of average costs of fuel and spare parts, and perhaps indices such as the average number of breakdowns per vehicle per year, average size of repairs to buses and average running costs of each depot. These could have been compared with average test scores and other indices at a depot-by-depot level. Costs of accidents could also have been useful. It was mentioned earlier that each accident has to be reported formally - if the cost of rectification is in excess of a certain amount then in most cases a full report is sent to SMT Insurance. Information on accident costs could have been used at either an individual driver level (eg, an average cost of each driver's accidents) or aggregated for use at a depot level, along with the other statistics above. Despite considerable efforts by the researchers, none of this data was forthcoming. In particular with the first category, the more competitive environment which followed deregulation in October 1986 has made the individual companies even less willing than they were to divulge data of this nature, which could potentially be of great benefit to their competitors.

A different aspect on the collection of performance data would have been to undertake some form of observation of individual drivers. This could have been either as a definite outsider, travelling on buses and watching how individual drivers coped with the demands of the job, or for the researcher to have become a participant observer, taking on the role of a driver and watching his colleagues at work. No form of direct observation was in fact used. One of the problems would have been to find ways in which to make the many observations or ratings compatible with each other so that they could have been analysed statistically. All the other data in the research is in numerical form. Another difficulty might have been one of ethics - would the driver have been told that there was someone on his bus assessing his performance? What would happen if the driver was not told but discovered that this was occurring? How could the differing social, cultural and traffic conditions be controlled for across the country? If drivers had been told, would that have affected their performance in the way that car drivers tend to be more careful when they see a police car near them? There was also the logistical problem of observing nearly seven hundred drivers. These were the main considerations in deciding against collecting this form of performance data; on the other hand plentiful data was available from individual driver and depot records.

4.10 Data analysis

4.10.1 Coding

A system for coding the background and performance data was devised, and two part-time clerical assistants were employed to transfer this qualitative and quantitative data into a form which could be analysed by mainframe computer. This took four months; the completed sheets, along with the test scores, were forwarded to the

University's Data Preparation Service to be keyed into a computer file.

The eventual sample, from which both personality and performance data were available, was therefore somewhat altered from the original. Complete records existed for 613 drivers, or 61.5% of a potential sample population of 997.

4.10.2 Methods of analysis: overview

The statistical analysis was carried out using the Statistical Package for the Social Sciences: "SPSS-X" (release 2.1) on the Edinburgh University mainframe computer (Amdahl V7). This powerful package enabled a wide range of statistical operations to be performed.

The results are presented in three chapters. The first describes all the variables, in terms of means, standard deviations and frequencies. With all but the test data, the drivers who participated in the research were compared with those who did not, using the Student's t-test to determine whether the two groups differed significantly. The second results chapter takes the analysis one stage further, by examining the correlations between variables. The final chapter reports on the results of multivariate analysis. It covers not only analysis of the data as a whole, but also that of sub-sections (younger/older drivers; those in large/small depots).

The statistical techniques used in the first two chapters of results were of a fairly elementary nature - means, standard deviations and Pearson product-moment correlations - and receive no further mention here. The final, multivariate analysis is of greater complexity and receives more detailed treatment in the next section.

4.10.3 Methods of analysis: multivariate analysis

Multivariate techniques were used in this research to analyse statistically the data. These techniques enable a number of interrelated variables to be examined together, taking the analysis a stage further from the bivariate level of correlation. The multivariate approach encompasses a number of different techniques: multiple regression, for example, produces a formula which relates a dependent variable to a number of independent variables; canonical analysis is similar but with more than one dependent variable; and multivariate analysis of variance examines the equality of sets of means for different populations. Other techniques in this field include cluster analysis, which classifies objects, persons, animals into groups with common characteristics and discriminant analysis which produces equations to distinguish between members of mutually-exclusive groups (Norusis, 1985).

The technique used in this research was factor analysis. It can first be described using Cattell's (1966b) system for analysing the dimensions of "mathematico-statistical" methods, using similar notation to that for the experimental designs. It becomes

(code 7) e h g p

The first dimension is the extent of the measurement property assumptions of the statistics used: in this case "e" stands for extended, as parametric, distribution-assumed data and statistics are used. The second dimension is the degree of built-in complexity of the statistical model used: "h" refers to highly-structured. The third code refers to the number of simultaneous relationships handled: "g" stands for multiple and general relationships. The final part - "p" - stands for plenary use of all the information available, as opposed to a limited use. Cattell specifically defines this formula as one applying to factor analysis.

The following covers a general discussion of the technique and its potential, as well as the particular variations used in this research. It does not cover in any depth its algebraic and geometric theories and properties, which are discussed in detail in Cattell (1966c, 1978), Lawley and Maxwell (1971) and Maxwell (1977), for example.

Factor analysis is essentially a simplifying process, as Child (1970) says, "Factor analysis seeks to do precisely what man has been engaged in throughout history, that is to make order out of the apparent chaos of his environment" (p.1). Similarly, Kerlinger defines it as serving

> . . . the cause of scientific parsimony. It reduces the multiplicity of tests and measures to greater simplicity. It tells us, in effect, what tests or measures belong together . . . It thus reduces the number of variables with which the scientist must cope. It also (hopefully) helps the scientist to locate and identify unities or fundamental properties underlying tests and measures (p 659).

It refers to the belief that the variation in a number of observed variables can be accounted for by a smaller number of underlying constructs (hypothetical entities) known as "factors". All variables (such as test scores or performance data) are treated alike, which is where it differs from some of the other statistical techniques referred to above. These tend to involve the use of regression equations to predict a dependent variable from a number of independent variables. "Factor analysis" is something of a generic term - it embraces a wide variety of methods and computer programs, and only those particular operations which were used in the research will be discussed here.

The process of factor analysis is useful for several levels of research. The first is essentially exploratory and descriptive - it enables the reduction of a large number of seemingly confusing variables to a smaller number of factors which can be used to describe the group being studied. This may well enable the generation and testing of initial hypotheses to take place, even at the level of trying out "hunches". The second, confirmatory level takes this further, in creating and testing hypotheses - the underlying dimensions from the first stage may suggest causal relationships. A third level is the use of the technique as a measuring device, to construct indicies to be used as variables in future analyses. In this research project only the first level, descriptive, is used to reduce test variables and performance measures to a more manageable number. This will enable propositions about the determinants of bus driver performance to be put forward.

There are three main stages which factor analysis goes through. Each can be performed automatically by computer. In this research, the "Factor" program of SPSS-X analysed the data using specific procedures and algorithms. The first stage is the preparation of a correlation matrix: ideally, there should be a fairly high degree of inter-relationship amongst them. Next is the extraction of initial factors from this. Classical factor analysis is based on the belief that there is some underlying regularity in the data being analysed, and that part of each variable is influenced partly by common variance (that shared with other variables) and partly by unique variance (not contributing to the relationships amongst variables). The analysis seeks to extract the maximum amount of common variance to explain the relationships in the data.

The particular extraction method used here was alpha factoring (Kaiser, 1963) which assumes that the variables used in the analysis are a sample from the universe of potential variables. The intention is to make inferences about this universe from a sample of variables; it is assumed that the variables were collected from a given population of subjects. This differs from other methods (such as maximum likelihood and unweighted least squares) which consider the cases in an analysis to be a sample from a population and the variables to be fixed.

The final stage of computation takes the factors which have been extracted and rotates them into a more meaningful and interpretable pattern, which will enable new insights into the data. This is the goal of factor analysis. There are two major methods by which the factors can be rotated - orthogonal and oblique. Orthogonal rotation produces mathematically simpler factors, but treats them as being unrelated. By contrast oblique rotation, which was used in this research, treats the factors as being correlated with each other, and this is felt to produce much more meaningful factors.

Cattell is a strong supporter of the second method of rotation, arguing that "we should not expect influences in a common universe to remain mutually uninfluenced and uncorrelated" (1978, p 128), and that

> all research on second and higher order factor structures - which often greatly illuminate our scientific concepts - is cut off, as completely as circumnavigation of the earth by a belief in a flat world, when we insist on the mathematical habit of orthogonality" (1966c, p 211).

The latter is a most important argument in this research study, as the data from the 16PF is subjected to factor analysis. As its name implies, this test gives scores on 16 first-order factors; any further factor analysis therefore produces second-order factors. If it was assumed that the first order factors were uncorrelated, then higher order analysis would be impossible.

The rotation was performed using the "oblimin" algorithm on the "Factor" procedure of SPSS-X. Computer rotation is, however, rejected by both Guilford (eg, Guilford and Zimmerman, 1963; Guilford, 1985) and Cattell (1966c, 1978) who prefer hand rotations. Guilford considers that computer rotation may underestimate the true number of factors, as it may reject those with small loadings which nevertheless could contribute to understanding of the data. This may oversimplify the nature of the factors. In addition, Cattell warns of a "misplaced faith that automatic programs, being couched in terms of mathematical perfection, are bound to give the correct result" (1978, p 130). Rotation by computer was performed in this research, as the intention was to use factor analysis as a tool to discover the determinants of driver performance, rather than to study factor analysis as such.

The last task in a factor analysis, once the mathematical stages are complete, is that of giving the factors meaningful names. This often involves some subjective judgement in order to ascertain the meaning behind the results: Lemke and Wiersma (1976), for example, say that naming is easier in well-researched areas such as personality and intelligence than in less researched areas or where factors appear more obscure. Van Geer (1971) takes a more straightforward approach - he recommends making a guess on the basis of the (measured) variables which the factor is (and is not) correlated with. Gillham (1978) warns that the names may not fit the factors very well, and that, once named, a factor may be associated with its unsuitable name for eternity.

4.11 Summary

This chapter has reviewed a number of themes pertinent to the research. It first examined the theories underlying the structure of the research - in particular those of Cattell and Randell - before discussing the design. The methods were then dealt with both at a theoretical level (the rationale for their use) and at a practical level (the particular methods used). The final section examined in more detail the main statistical method used to analyse the data - factor analysis - as a prelude to the full treatment of the results which now follows.

CHAPTER FIVE

RESULTS (1): DESCRIPTIVE STATISTICS

5.1 Introduction

This chapter examines the basic data from the psychological tests, biographical, situational and criterion measures. SPSS-X procedures sorted the data into suitable forms for analysis. For the data which was in interval or ratio form (for example, age and service, accident and discipline records) the "breakdown" procedure was used to produce means and standard deviations for each variable by depot and by group. Less could be obtained from the data which was mainly in nominal form (such as previous employment) - here, "frequencies" produced counts of the presence or absence of a variable after having been sorted using "sort cases" and "split file" procedures.

A word of caution should perhaps be inserted at this stage in connection with data in interval or ratio form. A number of the depots produced very small samples (several are less than 20), where the presence of one or two either very high or very low values could distort the arithmetical mean. In such cases a check was kept on the actual frequency distributions and any such cases will be highlighted in the course of the text.

In order to examine how representative those who sat the psychological tests were of their depot as a whole, Student's t-tests were also carried out on all "performance" variables from which it was possible to obtain means, to see whether significant differences existed between different groups. Very few significant differences were found: these are discussed in a section at the end of this chapter.

The results presented in this section are fairly extensive, each variable or category being broken down by depot. As a result, the text highlights the main features of the analysis with tables summarising the data where appropriate. The full breakdown of each variable is given in tables in appendices A and B. The results are presented in the three categories described in the research methodology chapter - test, "background" and "performance" data.

5.2 Analysis of predictor variables

This section presents the descriptive statistics of the predictor variables used in the research. The psychological test scores are analysed first followed by the biographical data.

5.2.1 Analysis of test scores

(i) The Ingleton Word Recognition Test

This 72-item test gives two scores - quickness on the uptake (as measured by the number of words correctly identified) and risk (number of words wrongly identified). Preliminary norms only were available, as research is still proceeding with this test, although a number of studies on specific occupational groups have been made and the sample of bus drivers is compared with four of them.

The drivers' scores on the Word Recognition Test were as follows:-

Table 5.1

Drivers' mean scores on the WRT.

	Mean	Standard deviation	Range
words correct	21.53	10.53	0 - 47
words wrong	3.93	3.13	0 - 19

In terms of quickness on the uptake the drivers scored lower than for the general population, although they did show a lower propensity to take risks, as the next table shows.

Table 5.2

Drivers' scores on the WRT, by grade.

(a) Words correct

Grade	Band	Scores	Proportion of drivers with these scores (%)
A	Top 10%	42-72	2.4
B	Next 20%	33-41	13.1
C	Middle 40%	22-32	35.8
D	Next 20%	13-21	24.9
E	Lowest 10%	0-12	23.7

(b) Words wrong

Grade	Band	Scores	Proportion of drivers with these scores (%)
A	Top 10%	0,1	24.0
B	Next 20%	2,3	29.1
C	Middle 40%	4-6	30.1
D	Next 20%	7-9	12.6
E	Lowest 10%	10+	5.7

To assist in interpreting these tables, 10% of a general population, for example, would obtain between 42 and 72 words correct in the test. However, only 2.4% of the sample of drivers had scores in that range. At the other end of the scale 10% of a general population would be expected to score 12 or less - nearly a quarter of the drivers did, though. The appropriate percentage bands for the driver sample were as follows:

Group	Words correct		Words incorrect	
	Overall pop.	Sample	Overall pop.	Sample
Top 10%	42-72	35+	0,1	0
Next 20%	33-41	28-34	2,3	1
Middle 40%	22-32	15-27	4-6	2-4
Next 20%	13-21	7-14	7-9	5-7
Lowest 10%	0-12	0-6	10+	8+

Further evidence that the drivers had lower than average scores can be found in the next table, which gives mean scores for four other occupational groups:

Table 5.3

Comparison of drivers' scores on WRT with other groups.

(a) Words correct

Group	N	Mean	Standard deviation	Range
Knitwear shop managers	55	30.65	10.21	7-56
Public house managers	32	26.03	9.66	9-48
Production operatives	40	25.33	10.42	5-49
Hotel receptionists	78	29.06	7.64	11-43

(b) Words incorrect

Group	Mean	Standard deviation	Range
Knitwear shop managers	4.11	3.12	0-11
Public house managers	3.59	2.64	0-11
Production operatives	3.43	2.71	0-10
Hotel receptionists	6.56	4.06	1-20

Source: unpublished research reports, C C P Ingleton and associates, 1985 and 1986.

All four groups had higher average scores for words correct, with the shop managers and hotel receptionists being the highest. None of the groups had very low scores, 5 being the lowest, for the production operatives, whereas 10% of the drivers scored 6 or less.

At the other end of the scale, three of the groups had higher top scores than the drivers, with 12.7% of the shop managers being in the top band (scores over 42). In terms of risk score (words incorrect) the bus drivers appear in the middle of the five groups tested, with the production operatives being lowest and the hotel receptionists the highest.

A breakdown of mean scores by depot is given in the appendix. There was a great variation for numbers of words correct, with Fraserburgh being the lowest (15.6) and Forres the highest (32.2). Most of the remaining depots were in the range 19-24 making Forres very much the exception. Its average was based on only six scores, however (26, 27, 31, 34, 36 and 37) none of which was below the sample mean. This can be compared with its main depot, Elgin, where scores ranged from 2 to 42 and five of the 16 drivers scored ten or less. At Fraserburgh four (of eleven) drivers scored ten or less, and the range was from 5 to 31. A more regular pattern was found with numbers of words wrong: the means ranged from 3.1 (Cumnock) to 5.1 (Hawick). Interestingly, Fraserburgh was the second-lowest (3.2) and Forres the second highest (4.8).

(ii) Cattell's "culture fair" test of 'g'

This gives five scores - one from each of the four sub-tests and a total. Published norms are available for only the total (IPAT, 1973); however, three of the four studies listed above also used this test, so the drivers can be compared against them. The scores for the sample of bus drivers were as follows:

Table 5.4

Drivers' scores on Culture Fair.

		Mean	Standard deviation
Test 1 (12 items):	next in a series	7.80	2.44
Test 2 (14 items):	classification	6.67	1.85
Test 3 (12 items):	matrices	7.72	2.27
Test 4 (8 items) :	discovering rules	4.87	1.90
Total (46 items)		27.08	6.34

N = 612 Range 4-43

Comparing the total with the published norms, once again the drivers were below average. The average score for the test as a whole was 32 (giving an IQ of 100); the drivers' mean of 27 gives an IQ of 91. The table below shows the proportion in each percentage grade:

Table 5.5

Drivers' scores on Culture Fair by grade.

Grade	Band	Scores	Proportion of drivers with these scores
A	Top 10%	38-46	4.3%
B	Next 20%	35-37	7.5
C	Middle 40%	28-34	37.4
D	Next 20%	21-27	36.1
E	Last 10%	0-20	14.7

The appropriate groups for the drivers are as follows:

Group	Scores
Top 10%	35-43
Next 20%	31-44
Middle 40%	24-30
Next 20%	19-23
Last 10%	4-18

The total scores can be compared with those for three of the occupational groups used for comparison with the Word

Recognition Test:

Table 5.6

Comparison of drivers' scores on Culture Fair with other groups.

Group	Mean	Standard deviation	Range
Shop managers	30.57	5.43	20-40
Production operatives	31.02	5.46	19-41
Public house managers	28.63	5.89	10-38

Source: C C P Ingleton and associates, op cit.

In this instance it was the production operatives who had the highest mean (and closest to the published norms). The drivers themselves had the highest individual score (43 correct), although also by far the lowest (4).

One possible explanation may be advanced at this stage to account for the bus drivers' scores being lower than the published norms and the specific occupational groups, on both tests so far described. The average age of the driver sample was higher than that for the other groups, with a wider range of ages represented, as the next section will discuss. The drivers' average was 39.8 years (S.D. 10.5) compared with the shop managers' (mean 34.9, S.D. 9.7) and public house managers (mean 34.7, S.D. 7.1), with the production operatives being closer with a mean of 37.6 (S.D. 9.1). As people get older, their ability to do these tests diminishes; therefore, as the drivers were (on average) older than the other samples, there should be little surprise in their scores being slightly lower. This relationship between test performance and age was borne out in the data on the bus drivers, as the section on correlations will show.

The full breakdown of mean scores by depot is again given in the appendix. In terms of total score Forres was again well above the average of 27.1, with a mean of 33.2. The next highest depot was Alloa (mean of 29.8) with the lowest being Peterhead (23.3). In terms of the sub-tests Forres had the highest score for all except the second (where Alloa was highest); there was no such pattern for those with the lowest score, which were respectively Hawick, Peterhead, Fraserburgh and Elgin. Two of the large urban depots - Edinburgh and Wishaw - along with Alloa consistently were above average on the subtests. Peterhead and its sub-depot Fraserburgh tended to be below-average on each occasion, while Wishaw always had a score greater than nearby Hamilton depot.

(iii) Cattell Sixteen Personality Factor Questionnaire (16PF)

This gives numerical scores on fifteen personality dimensions and one intelligence scale, with British Standardised norms being available (Saville, 1972). The mean scores for the drivers, along with the equivalent 'sten' scores, were as follows:-

Table 5.7

Drivers' mean scores on the 16PF.

Factor/Description (low/high)		Bus Drivers Mean	S.D.	Sten	National Mean	S.D.
A	Reserved/outgoing	9.67	2.82	6	9.35	3.09
B	Intelligence	7.15	1.92	6	7.17	3.14
C	Emotional stability (less/more)	14.27	4.04	5	15.25	3.88
E	Humble/assertive	11.50	3.96	5	12.28	4.28
F	Sober/enthusiastic	13.02	4.61	6	12.39	5.05
G	Expedient/conscientious	12.57	3.35	5	12.47	3.73
H	Shy/venturesome	13.18	5.67	5	13.25	5.51
I	Tough/tender minded	8.95	3.01	6	9.16	3.42
L	Trusting/suspicious	8.70	3.34	6	8.64	3.43
M	Practical/imaginative	11.15	3.43	5	12.37	3.45
N	Forthright/shrewd	10.94	3.18	6	10.52	3.06
O	Self-assured/apprehensive	11.86	4.17	6	10.27	4.27
Q1	Conservative/experimenting	9.43	3.27	5	10.12	3.23
Q2	Group-dependent/self-sufficient	11.28	3.68	5	11.60	3.48
Q3	Lacks/is socially-precise	12.78	3.24	6	12.79	3.30
Q4	Relaxed/tense	12.43	4.71	5	11.99	4.99

Sten scores (from "standard ten") are distributed over ten equal interval standard score points from one to ten, assuming a normal distribution. The population mean is 5.5 with the standard deviation being two sten scores. Between 4.5 and 5.5 is one half standard deviation below the mean, therefore; between 5.5 and 6.5 is one half standard deviation above it. All the scores for the driver population lay within this centre block.

Included also in the table are the means and standard deviations for a general British male population (Saville, 1972; table iv). Although these were based on a larger group (1104 subjects) the average age was identical to that of the drivers - 39.8 years. For each factor both sets of means look as if they are fairly close to each other. To see whether there were statistically significant differences between the driver group and the general population, a student's t test was performed on the means and standard deviations for each factor. Half were found to be different at a significance level of $p = 0.05$ or greater. Four factors had means greater than the national mean:

Factor	Description	Significance
A	Reserved/outgoing	$p = 0.05$
F	Sober/enthusiastic	$p = 0.01$
N	Forthright/shrewd	$p = 0.05$
O	Self-assured/apprehensive	$p = 0.01$

Another four factors had means significantly lower than the national mean:

Factor	Description	Significance
C	Emotional stability	$p = 0.01$
E	Humble/assertive	$p = 0.01$
M	Practical/imaginative	$p = 0.01$
Q	Conservative/experimenting	$p = 0.01$

This would appear to suggest that bus drivers who work for the Scottish Bus Group, when compared with a general British population, are more outgoing in nature but at the same time have more worries, are more easily annoyed and have a more practical and traditional outlook on life. In many respects this fits in with the nature of the job. Drivers are expected to be forthcoming and friendly with passengers, and tend to fit in better to the organisation if they accept and do what they are told without question. The job itself is of a practical nature, not requiring much in the way of intellectual thought. It can be fairly stressful at times, however, with responsibilities such as ticket issuing, fare collection, maintaining driving schedules, passenger and vehicle safety tending to weigh on the drivers' minds. They should be both shrewd and humble when dealing with passengers: shrewd enough to ensure that a young person does not pay a half fare when a full fare is due, and yet humble not to answer back to a passenger who is being rude or complaining.

This is very much an overview, however, and a discussion of the factors that make for either good or bad performance will come later. It is not entirely unexpected that there should be differences between the driver and general populations. The latter sample was drawn from all strata of the population, with care being taken to ensure a representative group in terms of geographical location, social group, marital status, working hours, terminal education age, and actual age. The drivers' sample, on the other hand, consisted of people from only one part of the UK who were members of only one socio-economic group. They tended to be less well educated, and came from a slightly narrower age range (most were between 21 and 64; those in the national sample were between 15 and 69).

The table below gives the depots with the highest and lowest means for each scale.

Table 5.8

Depots with highest and lowest mean scores on each scale of the 16PF.

Factor	Highest mean		Lowest mean	
A	11.07	Hawick	9.13	Fraserburgh
B	7.83	Forres	5.75	Fraserburgh
C	15.08	Alloa	12.32	Peterhead
E	13.31	Fort William	9.56	Elgin
F	14.25	Fraserburgh	10.87	Elgin
G	15.33	Forres	12.11	Hamilton
H	15.54	Fort William	11.26	Peterhead
I	10.54	Fort William	7.79	Alloa
L	10.71	Hawick	5.63	Fraserburgh
M	12.11	New Street	9.32	Peterhead
N	15.12	Fraserburgh	10.41	New Street
O	13.79	Peterhead	11.56	New Street
Q1	10.25	Alloa	7.67	Forres
Q2	13.00	Forres	9.87	Fraserburgh
Q3	13.63	Alloa	11.57	Hawick
Q4	15.00	Forres	11.74	Paisley

There was a fairly small variation on scale B (intelligence) but it did support the results found earlier, namely that the sample of drivers tested at Forres was above average in this respect. Their mean score for the total on the Culture Fair test was the highest; so was their mean score for scale B on the 16PF. At the opposite end of the scale, Fraserburgh and Peterhead had two of the lowest scores on the Culture Fair; this was repeated on the intelligence scale for the 16PF. The mean score for Elgin on factors E and F (9.56 and 10.87) were some way below the means of 11.50 and 13.02 respectively. The next lowest scores were 10.5 for E at Cumnock and 11.89 for F at Peterhead. A low score on factor E indicates a more sober and serious personality; on factor F, a more humble disposition. These are perhaps an indication of the sorts of drivers who participated in the research at Elgin - those who were less argumentative and more easily persuaded by the supervisor; those who did not take part were perhaps the more assertive members who followed the line taken by the (in the eyes of the management) militant shop steward.

Factor L showed some interesting variations between depots. A low score indicates a trusting and carefree personality; a high score supports a suspicious and distrustful nature. It could be postulated that the latter is more likely to be found in the larger depots where there is a less personal relationship between management and drivers. In fact the two depots with the highest means for this factor were Hawick (10.7) and Peterhead (10.3); next in line were Fort William (9.7), Wishaw (9.2) and Elgin (9.1). Peterhead had one of the highest scores, yet its sub-depot Fraserburgh had the lowest (5.6) with Forres being the second lowest (7.0). In addition, it tended to be the smaller depots which had the higher scores on factor N. A low score on this dimension supports a more forthright and open personality; a high score a more shrewd and calculating disposition. Once again, the opposite to what might have been expected occurred: the depots with the highest means were Fraserburgh (15.1), Forres (13.8) and Peterhead (12.4); at the larger depots the scores were all slightly below or around the overall mean for the sample.

Among the other scores there is an interesting contrast between scales Q1 (conservative vs experimenting) and Q3 (undisciplined self-conflict vs socially precise). Alloa had the highest scores on both factors, whereas it might be expected that a low score on one would be matched by a high score on the other, and vice-versa. The small size of the sample at Forres (six cases) perhaps accounts for the unusually high scores on scales Q2 and Q4: both were very much above both the average and the next highest in each case.

It is also perhaps surprising that Peterhead and Forres were highest for O and Q4 respectively. High scores on these tend to indicate apprehensiveness and worry (O) and tension and frustration (Q4), each of which might be expected to be related to working in busy urban conditions. In fact, the opposite is the case - Edinburgh and Paisley have the lowest scores on these factors.

5.2.2 Analysis of background variables

(i) Age, service and joining age

The mean age of the sample was 39.8 years with a standard deviation of 10.5. On the whole, the urban depots had a lower average age than the rural depots: Edinburgh had the lowest (at 38.9 years), whereas the average for Hawick was 48.4 and for Fraserburgh it was 51.0. These patterns are borne out when looking at the range and skew of the age distribution. There were a greater proportion of younger drivers at the large depots (those with over 100 drivers) - at Edinburgh, Paisley and Hamilton 10% of the drivers were aged less than 29 years, compared with Elgin where only 2 of the 42 drivers were under 30 and Fraserburgh where the youngest driver was 35. Each depot contained drivers aged 60 and over, but the smaller ones tended to have a greater proportion of older men. Over 50% of drivers at Hawick and Fraserburgh and 40% of those at Fort William and Elgin were over 50 years of age. This contrasts with depots such as Edinburgh (18% over 50) and Hamilton (16.5% over 50).

Similar patterns were observed for length of continuous service. The average for this variable was 8.24 years with a standard deviation of 7.93. Overall, drivers in the large depots had a lower average length of service than those in the smaller depots, though there were one or two interesting exceptions. The mean lengths of service for the four large depots ranged from 5.83 for Paisley to 8.30 for Wishaw. Alloa, however, had a mean of 6.94 and Forres was even lower with 4.75 years. The remainder were higher, with Cumnock having the highest average length of service - 14.3 years. There was a fairly wide range of actual lengths of service in most depots, but within this, it was the smaller, more rural, depots which had the greater proportions of drivers with long service. 25% of Cumnock's drivers, for example, had more than 20 years' service, and 50% of Hawick's had over 15 years'. This can be compared with Edinburgh where only 10% of the drivers had more than 20 years' employment, but where 50% had less than 4 years'. In Paisley, only 10% had more than 15 years' experience but 50% had less than 3 years'. In Cumnock, by contrast, only a quarter of drivers had less than ten years' employment.

Averages and ranges do mask individual cases in small depots, however. In Fort William, for example, the driver with the longest service came in 1939, the one with the next longest in 1966, with one or two in each of the following years. The present complement of Forres depot comprised drivers who joined as follows: 1 in each of 1966, 1970, 1980, 1981; 4 in 1983 and 2 in 1984. It is not known whether there were a number of resignations or retirals in the early 1980s, but the structure there was biased towards those with little service.

The figures for the large depots were in part a reflection of local labour markets, even in the central belt of Scotland where turnover was still fairly high. Edinburgh depot, for example, took on 43 new drivers in 1984. The effect of specific events was more noticeable in the smaller depots. Although there were some long-serving drivers at Fort William, two-thirds of those employed there had less than 10 years' service, and this can perhaps be attributed in part to the improvement of local employment opportunities in the last decade with the expansion of the wood pulp mills. There was some turnover at the bus depot in the mid-1970s, as drivers left to take up the better pay offered by the mills, necessitating a search for replacements. In Peterhead a similar situation arose with the development of the North Sea oil industry in the 1970s, where again the prospect of high wages (even for semi-skilled work) attracted a number of drivers away. 50% of Peterhead's drivers had less than 6 years' service.

In a more negative vein, the lack of local employment opportunities combined with a decline in the traditional coal mining industry, was perhaps a major reason for the high average length of service at Cumnock. Another factor accounting for this might be the decline in the numbers employed as a result of "Scotmap" - these fell from 100 in 1982 to 66 in 1985, with presumably those with the least service being made redundant first of all.

A comparison of the range and skew figures illustrates that while a number of drivers with long service did take part in the project, in many depots it was predominantly those with shorter service who did so.

The third variable in this group - age on joining - was computed by subtracting length of service from current age. The mean age on joining was 32.5 years (standard deviation of 8.7), with the lowest being at Cumnock (30.6) and Wishaw (30.9), and the highest at Fort William (37.7) and Peterhead (37.5). The ages ranged from 17 to 59 years. It is not possible to obtain a full PSV licence until the age of 21: those entering under that age often did so as conductors and transferred to driving at 21. In this category were mostly those in large depots, where on-going turnover of drivers enabled conductors to progress if they wished, and where redundancies were few when the move to one-man-operation came. At the other end of the scale, those entering at a high age were often those who had been previously employed and did not therefore require training. Almost all those in this category were in the large depots (eg, 8 of the 81 drivers seen in Paisley; 7 of the 138 drivers seen in Hamilton) where re-employment was much more common than in the small depots.

(ii) Application form data

As mentioned in the research methodology chapter, in some depots forms were only available for some of the drivers. The data presented here, therefore, should in some cases be taken with caution as it may not paint an accurate picture of the depots concerned.

The first section concerned licences held at the time the driver commenced his present employment, with data being available for 60% of the sample. The data for the basic driving licence was recorded in terms of years, as this was usually recorded accurately on the form. The mean number of years was 12.06, with a standard deviation of 8.28. In general (and this was perhaps a reflection of the higher age profiles) those entering the smaller depots had more years' driving experience than those joining the larger ones. Peterhead, for example, had a mean of 19.67 years and Fort William one of 19.50. The four large depots ranged from 10.72 at Hamilton to 13.73 at Paisley. An exception to this was Cumnock, with 9.3 years, although data was only available on 12 drivers (18% of the depot).

The two other classes of licence considered were those for public service vehicles (PSV) and heavy goods vehicles (HGV); in both cases merely the presence or absence was recorded. Overall, around a half of present drivers held a PSV and 15% an HGV licence prior to joining their present depot. There was, however, some variation from this average. The proportion of HGV holders entering (or re-entering) the industry appeared to be much greater in the smaller depots. 57% of those at Fraserburgh, 45% at Fort William and 44% at Hawick, for example, were in this category as compared with only 2% at Hamilton and 9% at Paisley. Although these figures may not be totally accurate they do show an interesting trend, which may be a reflection of more plentiful opportunities for lorry drivers in the central belt.

The proportion holding a PSV licence was much higher in Peterhead (89%), Elgin (80%) and Fort William (64%), and lower in Hawick (40%) and Edinburgh (42%). One possible explanation for these differences might be the presence or absence of other operators: certainly in the Wishaw area there are several fairly large independent operators and virtually none in Hawick. Several of Peterhead's drivers have either transferred from other SBG companies (especially Midland) or from municipals or NBC subsidiaries in England.

In most cases it was possible to see where these drivers were employed previously. Looking at the trends for the overall population, most of the drivers fell into one of the categories of previous employment with present company, with either a municipal operator or NBC subsidiary, and with an independent operator. As some of the categories are mutually exclusive it is possible to aggregate some of them as follows:-

Table 5.9

Previous employment in bus companies.

Category	Number	% of total (481)
Present company - resigned	130	27.0
Present company - previously dismissed	21	4.4
Municipal/NBC	66	13.7
Independent operator	45	9.4

For the depots studied, over a quarter of drivers had one or more periods of previous employment there. Although the recession has reduced employment opportunities, these figures are a reflection of the problems of labour retention which the industry has faced in the past. The figures were much greater for the industrial areas - Hamilton (41.6% of drivers) and Wishaw (44.4%) being particularly high - than the rural ones where alternative employment tends to be less readily available. Equally interesting is that 21 had been dismissed from their depots and then re-employed at a later date, despite some having their record cards marked "Do Not Re-employ". Most of these cases were at the large urban depots (in particular Hamilton and Wishaw), and this again may have been a reflection (certainly of up to a few years ago) of labour shortages.

Substantial numbers have also had previous experience in the municipal sector or with the NBC - this was especially so at Edinburgh where 46 drivers (28.2% of those for whom records were available) were in this category. Most had come from Lothian Region Transport. Four drivers at Fort William (one-third of those for whom records were available) were also in this category - according to the area manager some were people from England who came to the area on holiday, liked it and wanted to settle there. There was also some degree of movement between public and private sectors as the 45 drivers who had worked for the latter shows. This was noticeable in areas where the latter was well-represented: Wishaw (8 drivers) and Paisley (9), for example, and the movement was often two-way.

It was mainly in the urban areas where substantial numbers of drivers had previous bus company employment. Fraserburgh, by comparison, contained only one driver in this category, Hawick four and Cumnock eight. Alloa appeared to have more in common with the larger depots in industrial areas when considering the variable of bus company employment. Overall, almost a third of the drivers have had previous employment at their depot. One had been dismissed, and six had worked for an independent operator.

In addition to the above, data was also collected on all other types of previous employment. Taking the overall picture, the three main categories were:-

manual semi-skilled	133 cases	29.7%
manual skilled	85 cases	18.9%
driving (licensed)	103 cases	23.0%

Between 25% and 40% of the drivers in most depots have had at least one semi-skilled job prior to joining their company - Peterhead was the exception, where the total was only two out of the 14 tested. The larger depots tended to contain a greater proportion of drivers from skilled jobs than did the small, rural ones, although Hawick was an exception to this. This may well have been a function of the fact that skilled trades are more in demand in industrial areas, and that in recent years they have suffered with the decline of heavy industry in the central belt.

The third main category was that referred to as "licensed" driving: this included HGV driving as well as delivery vans and taxis, in other words all driving apart from buses which requires a licence. In the small depots in particular, this accounted for quite a substantial number of drivers: 60% in Fraserburgh, 21% in Peterhead and 37.5% in Cumnock have had at least one driving job. Among the other categories, certain ones had significant representation in selected depots. Service in the armed forces or police, for example, accounted for one-third at Forres and a fifth at Elgin - due, no doubt, to their proximity to the RAF base at Kinloss. 26 drivers at Edinburgh (16%) also had this background, and were usually willingly offered employment because of it. Edinburgh had the greatest range of occupations represented - from unskilled manual to managerial - due in part to its size and the nature of the city in which it is located. The greatest proportion of semi-skilled workers was at Fort William (6 out of 11), many of them laid off in the contraction of the wood pulp and aluminium industries in the early 1980s.

Connected with the types of previous employment were the number of jobs a driver had held in the five years prior to his present job. This included any jobs, permanent or temporary, although excluded periods of unemployment. The period of five years was chosen as the SBG application form requests details of all employment in this period, and could provide some sort of measure as to how stable individual drivers were. The mean number of previous jobs overall was 2.29 with a standard deviation of 1.17. The lowest were Fraserburgh and Forres (2.0) and the highest Hawick (3.1) and, while it appeared that the larger depots had slightly higher averages, this was not a hard and fast rule. In most depots the number of previous jobs ranged between one and five, with most drivers having held between one and three. In Hamilton there were two drivers who had held six jobs and at Edinburgh one who had held seven jobs in the five years prior to commencing employment, but these were the exceptions.

The final category which can be considered under background variables is level of education. This produced the variable of the highest level of education attained. Overall, only 39.5% of drivers had some sort of educational qualification, the most common one being either a college diploma or (in the majority of cases) a trade qualification (usually "City and Guilds"). This accounted for 21% of all drivers, the next most common being a "general certificate" held by 9% of drivers. This preceded the present day system of O/A levels, and is mainly held by older drivers. This accounted for so few cases at Hamilton and Wishaw: the educational attainments of the longer-service drivers were not known as all application forms before 1979 had been destroyed. In general, the drivers at the larger depots were better qualified educationally than those at smaller ones - half of those at Edinburgh and Paisley having some qualification (although only 29% at Hamilton and 28% at Wishaw). At the smaller depots, only one out of 14 at Elgin, two out of nine at Peterhead and four out of 23 at Cumnock had qualifications. Edinburgh contained the greatest proportion of well-educated drivers, including three out of the five who held degrees and the greatest proportion of those who held a diploma or trade qualification (26%).

5.3 Analysis of criterion variables

The final set of variables which can be considered on a depot-by-depot basis are those relating to "performance" - offence and accident records, along with miscellaneous items such as cash shortages and absenteeism. The mean figures for the offence and accident categories were low because the actual figures have been divided by the number of years for which records were available - therefore, the figures represent an annual average. Once again, the full breakdown of figures by depot and by category is given in the appendix.

5.3.1 Offences

(i) General

Moving first to offences, the table below summarises the means and standard deviations for each category.

Table 5.10

Summary of offence variables.

	Offence	Mean	Standard deviation
1.	Poor timekeeping	.25	.47
2.	Ticket issuing faults	.42	.68
3.	Failure to stop	.14	.35
4.	Rudeness	.06	.20
5.	Carelessness	.21	.36
6.	Quality of driving	.03	.13
7.	Excessive absenteeism	.08	.26
8.	Excessive cash shortages	.27	.73
9.	Miscellaneous	.01	.08
10.	Complaints	.12	.30
11.	Commendations	.05	.24
	Total offences	1.47	1.75

["Total offences" is the sum of the first nine items.]

Such overall figures hide important variations, however, as can be seen from the next table which shows the number of drivers with clean offence records in each depot. No drivers in Alloa, Hawick or Wishaw had clean records, and only a small proportion had in Edinburgh (3.5%). By contrast, over half the drivers in Hamilton and three quarters of those in Cumnock were in this category. It is particularly interesting to note the difference between Hamilton and Wishaw: both belong to Central Scottish and are no more than five miles apart, yet there appears to be great differences in policy towards the recording and punishment of offences.

Table 5.11

Number of drivers in each depot with clean offence records.

Depot	No.	%
Fraserburgh	3	27.3
Forres	1	16.7
Hawick	0	0.0
Fort William	1	6.7
Peterhead	3	13.6
Alloa	0	0.0
Elgin	5	29.4
Cumnock	36	78.3
Paisley	27	34.2
Hamilton	64	48.1
Wishaw	0	0.0
Edinburgh	1	0.6
Total	141	23.7

This difference manifests itself also when looking at the figures for total offences. Here the overall average was 1.49, but for Hamilton it was 0.80 and for Wishaw it was three times as great, 2.68. The figure was highest for Alloa (3.09) and lowest for Cumnock (0.14) with Hawick and Edinburgh being above average and the rest below. Looking back at table 5.10, it would appear that some offences were "committed" more often than others. The most common were those relating to ticket issuing faults, excessive cash shortages and poor timekeeping. Those least reported included reports on the quality of driving, rudeness to passengers and/or company officials, complaints, failure to stop and uplift passengers, and excessive absenteeism. There were also very few commendations, most being made to drivers at Edinburgh on account of their work on extended holiday tours.

(ii) <u>Discussion of specific offences</u>

"Timekeeping" was one of the categories with a fairly high mean score, ranging from Elgin and Fraserburgh (0.00 and 0.01) to Wishaw, the highest at 0.60. Edinburgh, Hawick and Forres were also high (over 0.2).

A failure to issue tickets correctly may well be considered one of the worst offences a driver can commit in Eastern Scottish, as the mean scores for both Edinburgh and Hawick were by far the highest for this category, at 1.03 and 0.97 respectively. Indeed, at the former depot, nine drivers had ten or more "convictions" for offences in this category (over a five-year period); and at the latter four drivers had eight or more convictions. All the other depots had means below 0.25.

The pattern for excessive cash shortages was somewhat different. At only five of the twelve depots did this appear on drivers' offence records, and of these the mean scores for Alloa and Wishaw were much higher than for Edinburgh, Hamilton and Paisley. The means for Alloa and Wishaw were 1.39 and 1.16 respectively. This wide variation was due in part to differences in recording and punishing shortages, as discussed in the previous chapter. At Alloa, for example, in this category (and within four years) two drivers had eight entries, and there was one driver for each of 9, 14, 19 and even 25 entries for cash shortages. There were similarly large amounts of interviews at Wishaw - two had nine, two had

11 and one had 18 within four years.

At this stage it is appropriate to bring in the figures for the number of weeks a cash shortage was reported. These were taken from the actual record books and were only available in some of the depots. It is interesting to note that the highest figures were for two of the Northern depots - Elgin and Peterhead - and for Hamilton. In the first two cases there were no records of drivers being reprimanded for cash shortages, and in Hamilton the figure was fairly low. Additional light may be cast upon this by examining the table listing the average size of weekly shortage - by depot and per driver.

Table 5.12

Average cash shortages per week per depot.

Depot	N	Time Period	Average Weekly Shortage (£) Total	Per Driver
Fraserburgh	12	6 months	2.84	0.24
Forres	12	3 months	1.01	0.08
Peterhead	37	6 months	14.03	0.38
Elgin	43	3 months	13.24	0.31
Cumnock	68	6 months	11.74	0.17
Hamilton	177	3 months	241.90	1.37
Wishaw	180	6 months	73.17	0.41

Those in the Northern Scottish depots were low and for small amounts per driver - Forres being by far the lowest: 8p per driver per week on average. There was a great difference between Hamilton and Wishaw, however, with the former having over three times the size of shortage than the latter. Perhaps this reflected the amount of importance which cash shortages were given in each depot. At Wishaw, where shortages over £2 were put on disciplinary records, the average weekly amount and the average number of weeks were lower than at Hamilton, where a less-strict approach was adopted but where shortages were much larger and more frequent. The case of Cumnock was different again: not only were there a low average total and a low number of weeks when shortages occurred, but there was no disciplinary action taken either. The Area Manager told the researcher that he preferred to use informal methods to reduce occasional cases of cash shortages. In the depots where detailed figures were available very few drivers had completely clean records. Most drivers had a cash shortage at some time or another within the time period.

General carelessness, a category which included a variety of offences from wearing non-uniform clothes to displaying the wrong destination on a bus, followed a similar pattern to other categories. The depot with the highest mean score was Hawick (mean of 0.40), followed by Alloa and Forres (0.35), Wishaw (0.34) and Edinburgh (0.33). Those with the lowest average number of offences under this heading included Cumnock (0.03) and Hamilton (0.09).

Most depots in the survey had received complaints from the public about the attitudes or actions of some of their drivers. No complaints were recorded against drivers in Cumnock, Fort William and Fraserburgh. The highest number were recorded at Edinburgh, where the average was 0.26.

Excessive absenteeism appeared as an entry on the offence records of most depots, with only Elgin, Fraserburgh, Forres and Peterhead being completely free in this respect. [Absenteeism in this context refered to absence from duty without permission, and did not include holidays or sickness as defined under statutory sick pay legislation.] Other than at those places, the fewest number of disciplinary actions for this were taken at Hamilton (mean of 0.007), whereas the largest number on average was over 50 times greater at Wishaw (0.32). At this depot five drivers had five entries and three drivers had six entries in this category. Fairly high numbers were also recorded at Alloa (average 0.12) and Paisley (0.11).

It is interesting to compare these with figures from depots where figures of the actual numbers of days absent were available. These are shown in the table below.

Table 5.13

Average annual days absent

Depot	Mean	S.D.
Hawick	0.00	0.00
Hamilton	3.47	3.61
Wishaw	2.46	2.74
Edinburgh	1.76	2.11
Overall	2.45	2.95

Although this was based on only a small number of depots in the sample, it is clear that absenteeism was worst at Hamilton where ironically the fewest drivers were disciplined for this. Average days absent at Wishaw was a little less, and yet disciplinary actions were just as high.

In similar vein, figures for the average number of times drivers were late in reporting for duty were also collected, and these are summarised below:

Table 5.14

Annual average days late for work, by depot

Depot	Mean	S.D.
Hawick	0.06	0.12
Elgin	0.26	0.28
Hamilton	0.71	0.99
Wishaw	1.27	1.58
Edinburgh	1.74	2.08
Overall	1.19	1.72

In this respect Edinburgh had the worst record: drivers were late for work on an average of 1.74 occasions per year. The problem was of far lesser proportion in the small depots of Hawick and Elgin, and in Hamilton. Perhaps if drivers there find that they are late for work they do not bother trying to get to the depot at all and take the day off. This may reflect the comparatively few occasions on which disciplinary action was taken for lateness and absence.

The use of overall averages in cases such as these may tend to give the impression that every driver has been late or absent on at least one occassion. The records show that this was not the case, however, and that there were quite considerable numbers who have perfect attendance records. The table below shows the numbers for each depot who were in these categories.

Table 5.15

Numbers of drivers who have clean records for attendance and punctuality.

	Absenteeism		Lateness	
Depot	No	%	No	%
Elgin	no data		6	37.5
Hamilton	27	19.7	75	54.7
Wishaw	5	7.7	17	26.2
Edinburgh	34	21.8	29	18.6
Overall	80	21.5	138	35.5

In terms of absence, the lowest proportion of drivers with clean records were found at Wishaw, which may account for the large average number of disciplinery actions for this. Although more drivers at Hamilton had a clean record for absenteeism, the average number of days absence was higher than Wishaw and this was reflected in the greater ranges. The actual numbers of days absence at Wishaw ranged from 0 to 13, with there being four drivers with ten days or more per year. At Hamilton the range was 0 to 16, but 17 drivers had ten days or more absence. There was much greater variation with lateness, with Edinburgh and Elgin drivers having the fewest clean records, and those at Hamilton and Hawick having the most. The ranges tended to be less than for absence, with Elgin being 0 to 4.7 and Hamilton 0 to 5, although Edinburgh was the exception: the numbers of days ranged from 0 to 12.5.

Finally in this section, brief mention can be made of the other discipline categories, where the average number of occurrences tended to be much lower. The mean number of offences for failure to stop and uplift was 0.14, with the worst depots in this respect being Wishaw (mean of 0.23) and Edinburgh (mean 0.28). All the other depots had scores well below the mean, with no drivers at Cumnock, Forres or Fort William having this offence on their record.

An interesting pattern was found with the rudeness variable (mean of 0.06). As with the previous case, Edinburgh was well above-average: the mean is 0.14. (One driver had had eight disciplinary interviews for this.) None of the drivers at Fraserburgh, Forres, Peterhead or Cumnock had offences in this category.

Quality of driving was another minor offence overall (mean 0.024), where it was often just a few drivers who had bad records in this respect. It was one such case that made Fraserburgh the highest for this category (mean of 0.078) - one driver had six such offences on his record over seven years; at Hamilton there was one driver with seven offences in two years. Fraserburgh apart, Edinburgh, Hawick, Wishaw and Alloa had the highest scores. At the other end of the scale, no driver at Forres, Fort William or Cumnock had offences in this category.

The final category was one of the few positive indicators of performance - commendations - if one considers that all the others are in effect negative in that they record when something has been done wrong. In virtually all cases, however, commendations only appeared on a record when a member of the public has written to the company congratulating a driver on his behaviour, and this has been passed on to the driver concerned. Hardly ever do traffic supervisors make commendations on their own initiative. Thus in a number of depots no drivers have any commendations, and only a few in most of the others. The depot with the highest average is Edinburgh, where the bulk of such compliments were from grateful passengers who travelled on coach tours operated by this depot. One driver had eight such letters, one nine, one ten and two had twelve each.

(iii) Disciplinary action

The reporting of a driver for any of the above offences will, in most cases, lead to an interview taking place. As a result disciplinary action is usually taken against the driver concerned and it is to an analysis of this that attention now turns. This was discussed in detail in the chapter on research methodology and it will be recalled that disciplinary action can range from the driver merely being interviewed (and perhaps instructed as to how to deal with a situation properly) through various levels of warning (verbal and written) to a period of suspension or even dismissal. Table 5.16 below gives a summary of the average number of actions in each category per driver.

Table 5.16

Average number of disciplinary actions per driver.

Category	Mean	S.D.
Interview/instruction	0.29	0.64
Verbal warning	0.95	1.33
Written warning	0.10	0.31
Final warning	0.03	0.14
Suspension (periods of)	0.10	0.26
Dismissal then reinstatement	0.02	0.22

This shows that a verbal warning was the form of action most used. "Interview and instruction" was the least serious result of a disciplinary interview, and was really the equivalent of no action being taken. The mean for this variable (0.29) was somewhat misleading, as Edinburgh had a score which was far higher (at 0.99) than any of the other depots, none of which exceeded 0.14.

Turning to the first proper level of disciplinary action - the verbal warning - Wishaw, Alloa and Hawick had by far the highest averages on this, being 2.78, 2.12 and 1.81 respectively. The high scores for the first two depots were, in part, a result of their policy in recording cash shortages, whereby any shortage over a certain limit (£1 for Alloa and £2 for Wishaw) automatically resulted in an interview, followed by a verbal warning or worse. Some drivers at these depots had very high numbers of warnings: at Alloa, for example, almost one-third of the drivers had more than ten in the five years for which the records were taken; five had over 30 and one (who was not tested) had 47 warnings. Six Hawick drivers had more than ten in the same time period, although the highest was a mere 19. Ticket issuing and general carelessness were the main causes here. The average numbers of warnings at Edinburgh and Hamilton were about one-third those of Wishaw and Alloa (at around 0.8) - at Edinburgh, for example, only five drivers had more than ten warnings in five years. Hawick excepted, it was at the smaller depots where warnings appeared less - at Fraserburgh the average was 0.11 for example and at both Elgin and Fort William it was 0.17 - with Cumnock having the least, at 0.06.

The next form of action, in terms of seriousness, was the written warning. As with most other types of action, the scale was much lower, and indeed the overall average was one-tenth that for verbal warnings. This general relationship did not hold for all depots, however, with the larger depots tending to have proportionately more than the smaller ones. Edinburgh, for example, had an average of 0.19 written warnings per driver which was a quarter of the number of verbal ones. Although these were the more extreme examples, the overall pattern was that Edinburgh, Wishaw and Paisley were above average in terms of numbers of written warnings per driver, with all the others being well below.

Forres provided an interesting exception to the general pattern of small depots having lower averages for disciplinary action than the larger ones. The average number of final warnings (0.056) was double the overall average (of 0.027) and behind only Wishaw (0.09) and Paisley (0.06). This should not suggest a harsh disciplinary regime at Forres, however, rather it was an illustration of the dangers of relying on arithmetical means in small samples without studying the underlying distributions. Only two drivers had received final warnings - both had only one year's service. In a small depot this was sufficient to make for a fairly high overall average. Paisley and Wishaw were the other depots which also had fairly high scores: in the former, in particular, this form of action appeared to have been quite extensively used. In other depots, this occurred much less frequently; indeed, no driver at Hawick or Fort William had received one.

There was an overall average of 0.098 suspensions per driver. The highest number occurred in Edinburgh - a mean of 0.22. Wishaw (0.12), Alloa (0.09) and Paisley (0.08) were also high. The lowest were in Hamilton (0.004) and most of the smaller depots. Once again, the figures for Forres were affected by one or two drivers with very short periods of service - one driver with two years' service had two suspensions, for example. At the other end of the scale, in some depots drivers had amassed fairly large numbers of suspensions. At Edinburgh, for example, three drivers had five, three drivers had six, one had seven and one had nine periods of suspension within five years. One possible explanation for this, advanced by an inspector, was that the continued shortage of drivers owing to high turnover meant that dismissal only took place in exceptional circumstances: an offence which might bring dismissal in any other depot, was often punished by a period of suspension or a final warning in Edinburgh. The figures in Paisley were similar: 26 had one, four had two, four had three and four had four suspensions. In the smaller depots this form of action was much less common, with it often applying to a very few drivers. In Peterhead, for example, there was one case of a driver having three suspensions, and at Cumnock one driver had four, but these were exceptions to the rule.

The final level of action for the purposes of this research was dismissal on those cases where the driver was reinstated after appeal. Dismissal is, of course, very much a last resort and in a number of the smaller depots - Forres, Hawick, Fort William and Elgin - there were none in this category. The highest average was recorded at Paisley - the mean was 0.085, where there were four drivers who had been dismissed and reinstated once, and two to whom this had happened twice. One of these had also received several periods of suspension and six final warnings within a period of eight years. Alloa also had a fairly high number of occurrences of this (three) - but this tended to be much less frequent in the other depots.

5.3.2 Accidents

(i) General

The final major category of data concerning drivers was that relating to accidents, divided into two main sections - collision and non-collision. Table 5.17 below summarises the means and standard deviations for each accident category as well as for the summary variables.

Table 5.17

Average number of accidents per driver per year.

Accident Type	Mean	S.D.
Collision Accidents		
with other vehicles	0.88	1.03
with pedestrians	0.03	0.15
with animals	0.03	0.19
with inanimate objects	0.26	0.45
total	1.20	1.15
Non-collision accidents		
boarding/alighting	0.05	0.22
aboard bus	0.14	0.38
vandalism - outside	0.32	0.61
vandalism - inside	0.04	0.17
miscellaneous	0.07	0.18
total	0.61	0.83
Average total number of accidents	1.81	1.59

Overall, the average driver in the depots surveyed had a mean of 1.81 accidents per year. There were approximately twice as many collision accidents as non-collision ones. The most frequently occurring type of accident was collisions with other road vehicles, with an average of 0.88 occurrences per driver per year. Next most frequent were collisions with inanimate objects (anything from fence posts and shop canopies to stone walls and the iron girders holding up the garages), with a mean of 0.26, and vandalism from outside (mean of 0.32). Apart from accidents aboard buses (mean of 0.14) the other accident types were comparatively infrequent.

Table 5.18

Number of drivers with clean accident records.

	Total collisions		Total non-collisions		Total accidents	
	N	%	N	%	N	%
Fraserburgh	0	0	2	18.2	0	0
Forres	0	0	2	33.3	0	0
Hawick	4	28.6	13	92.9	4	28.6
Fort William	1	6.7	10	66.7	1	6.7
Peterhead	0	0	6	25.0	0	0
Alloa	1	4.8	12	50.0	1	4.8
Elgin	0	0	1	5.9	0	0
Cumnock	7	15.2	16	34.8	5	10.9
Paisley	11	13.7	19	23.5	5	6.3
Hamilton	35	25.5	34	24.8	18	13.1
Wishaw	16	28.9	22	32.8	8	11.9
New Street	3	1.8	53	31.2	2	1.2
Total	78	12.9	190	31.0	44	7.3

Table 5.18 shows the proportion of drivers in each depot with a clean record for both each summary category and overall. There was only a small proportion of drivers

who had no accidents at all - 7.3% - with this ranging from none in some depots (such as Elgin and Peterhead) to 13% in Hamilton and over 28% in Hawick. A similar pattern can be seen in the numbers with no collisions - 12.9% overall - with depots ranging from none (Peterhead and Elgin) to over a quarter (Hawick, Hamilton and Wishaw). Around one-third of drivers overall had no non-collision accidents, ranging from 18% in Fraserburgh to over 90% in Hawick. Fort William and Alloa also had a high proportion in this category - the former with 67% and the latter with 50% This is somewhat surprising, as both depots had only one driver with no collisions and no accidents in total.

The proportion of drivers with clean accident records makes an interesting comparison with the figures for those with clean discipline records, presented earlier. 23.7% of drivers had no disciplinary entries in their records whereas only 7.3% had no accidents. One of the greatest differences was for Cumnock, where 78% were in the former category and yet only 11% in the latter. The opposite was the case at Hawick - all drivers had been disciplined at some time and yet over a quarter had no accidents.

Returning to the figures for the numbers of accidents at each depot, those for total accidents show the Paisley, Hamilton and Edinburgh drivers had the greatest amounts, with averages of 2.53, 2.07 and 1.86 respectively. The remaining depots were all below the average of 1.70, with the exception being Forres (1.93). This should not indicate that Forres drivers on the whole have more accidents than others, rather, it was once again the effect of having so many drivers with short lengths of service which can produce some unrealistic arithmetical averages. One driver had ten accidents in two years; another had eleven in two-and-a-half years. Those with low numbers of accidents per driver included Hawick (0.48), Fraserburgh (0.86), and Alloa (1.20).

(ii) <u>Specific accident types</u>

Turning first to collision accidents, those with the greatest numbers included Paisley (1.62), Edinburgh (1.51), Forres (1.38) and Peterhead (1.37) with Hawick (0.46) and Fraserburgh (0.65) the smallest. Collisions with other road vehicles were by far the most common form of accident to occur. In terms of the depot-by-depot picture, Edinburgh and Paisley were the worst in this respect, with averages of 1.20 and 1.16 respectively. In the former, for example, six drivers had ten collisions in this category, one had eleven, one twelve, three had thirteen, one fourteen, one fifteen, and one even had seventeen (over five years). The only other depot above the average of 0.88 was Peterhead (0.92), where six drivers had seven collisions with vehicles, and one had twelve. Amongst those at the other end of the scale were Hawick (0.33), Fraserburgh (0.46) and Wishaw (0.53).

The other major types of collision was that concerning "inanimate objects". The overall scale of these accidents was much less than for those with other vehicles, with an average of 0.26, and the highest being Forres (0.68) and Peterhead (0.44). The problem of extreme ratios with a small sample led to the high average score for Forres once again - it was mainly accounted for by one driver having five collisions with inanimate objects within the space of a year. Cumnock had the lowest occurrences of this type of accident - 0.07 per driver per year - followed by Hawick, Fraserburgh and Elgin.

Pedestrians and animals were the other two categories of collision accidents, both of which were almost negligible in comparison with the first two. The largest occurrences of the former type were in the busiest urban areas - Edinburgh, Wishaw and Hamilton. Pedestrians were safest in Forres and Hawick, where none were hit by buses. Collisions with animals were similarly infrequent, the victims most often being dogs. Paisley and Forres had the worst records for this category, with means of 0.08 and 0.07; the least accidents took place in Fort William (0.008) and Elgin (0.007), with none occurring in either Hawick or Fraserburgh.

The ratio of the proportion of collision to non-collision accidents overall was of the order of two-to-one. This, however, did not always hold. Some of the greatest differences were at Hawick, where the respective averages were 0.46 and 0.01 and Fort William (1.12 and 0.11). On the other hand, the two were almost equal at Hamilton and Wishaw. The most frequent type of non-collision accident was vandalism from outside the vehicles which usually took the form of stones, bricks and other missiles being thrown at buses with the object of breaking windows. The depot with the most cases of this being reported per driver was Hamilton, with a mean of 0.88. Sister depot Wishaw had a lower occurrence of this (0.25) as did Paisley (0.25). As an indication of the extent of the trouble at Hamilton some figures over a two-year period were interesting: 33 drivers suffered two occurrences of this, 19 suffered three, 11 had four, six had five, three had six and one had seven. By comparison, at Paisley 13 drivers had two cases of this and two had three, over a period of five years. Needless to say, this was much less of a problem in rural areas, with it not being reported at all in many of the depots there. Vandalism inside buses was much less of a problem overall, (with a mean of only 0.04), with no cases being reported in Fraserburgh, Forres, Hawick or Fort William. Wishaw was the one exception to this, with a mean of 0.16 which was three times as great as the next largest depot, Hamilton.

Apart from this the other major form of accidents in the non-collision category concerned those taking place on board buses. The overall average was 0.14, with all the rural depots and Hamilton being well below it. The worst depots in this respect were Paisley (0.34) and Edinburgh (0.21). At Paisley the average number of boarding and alighting accidents (0.23) was also well above the average of 0.05. This category concerns passengers who trip or fall whilst boarding or alighting from a bus, whether injury arises or not, and in Paisley there were several cases of intending passengers actually collapsing and dying whilst doing this. It is hard to provide possible explanations for the reason why Paisley should have so many cases of this type of accident. All the Bus Group companies have a mix of vehicles, and it is not the case that Paisley has a greater than average proportion of single-deckers with the Alexander "Y" type bodywork, which feature three fairly steep steps up to the main deck.

The final category (miscellaneous) covered those accidents which could not easily be classified into any of the other groups. Interestingly, it was some of the rural depots which had the highest scores here. The average overall was 0.07, but for Elgin it was 0.43 and for Forres it was 0.21. Windscreens broken by loose chippings on the roads were the main cause of this, with one or two Elgin drivers having six or more such cases on their records. A possible explanation for this is that the winters can be very harsh up in the north-east of Scotland, with frost action exploiting any weaknesses in road surfaces and causing stones to come loose. Similarly, there is often not the same volume of traffic up there to sweep loose stones to the side of the road as there is in the central belt, and consequently buses there may be more vulnerable to such stones.

(iii) Disciplinary action

In common with offences, once an accident report has been submitted the Traffic Supervisor will interview a driver to determine whether he was at fault or not. If a driver was at fault, then appropriate action is taken ranging from "no action" (meaning "at fault, but no action taken as the accident was very minor and being the equivalent of "interview and instruction"), through the range of warnings to suspensions and dismissals. The table below summarises the number of disciplinary actions per driver.

Table 5.19

Average number of disciplinary actions for accidents per driver.

Type	Mean	S.D.
Not at fault	1.03	1.10
No action	0.34	0.59
Verbal warning	0.27	0.45
Written warning	0.05	0.18
Final warning	0.01	0.22
Suspensions (periods of)	0.10	0.46
Dismissal then reinstatement	0.006	0.14

The most common outcome in the case of acccidents was "not at fault" - this accounted for the majority of disciplinary actions, with "no action" coming second. This implies that in many cases drivers who were involved in accidents received no adverse reports on their record: they were either not to blame for an accident taking place or, if they were, no action was taken against them. When action was taken, the verbal warning followed by periods of suspension were most often used. Written and final warnings, and dismissal, were comparatively infrequent.

It is interesting to compare this with the table of disciplinary actions for offences discussed earlier. The overall scale of actions taken for accidents appeared to be much lower than for disciplinary offences. There was an average of 0.27 verbal warnings per driver for the former, for example, whereas in the latter the average was 0.95 per driver. Suspensions are the one category which were the same. On the other hand there was a much greater incidence of cases where no action was taken: an average of 1.37 for accidents (if "not at fault" and "no action" are added together) as against 0.29 for offences.

Taking the individual categories for disciplinary action, "not at fault" was the most common form occurring most often in some of the large depots - Paisley (mean 1.66), Hamilton (mean 1.46) and Wishaw (mean 1.23) in particular. By contrast Edinburgh had one of the lowest scores for this variable - a mean of 0.56 - along with most of the smaller depots such as Fraserburgh, Alloa and Peterhead. Comparing the records over the last five years for Paisley and Edinburgh drivers, in the former depot were 15 drivers with ten or more "not at faults" on their record, with one having seventeen and one nineteen. By contrast, at the latter only two drivers had more than ten - one with eleven and one with thirteen.

The situation between these two depots was reversed when studying the next variable - no action for accidents. Edinburgh in fact had the highest number (an average of 0.60 per driver) and Paisley the lowest (mean of 0.01), with the average being 0.34. These differences were confirmed when looking at the frequencies for each depot: at Paisley seven drivers had one no action and one had three; at Edinburgh 72 drivers had three or more, with three drivers having nine such items. Hamilton also had a high score on this variable - a mean of 0.58 - in complete contrast to Wishaw where there were no instances of no action reported. Most of the rural depots had low scores for this, as did Alloa and Cumnock, although Peterhead was an exception with an above-average score of 0.42.

The verbal warning was the most common type of positive action taken where a driver was at fault for an accident, with an average of 0.27 occurrences per driver per year. The depots with the highest scores on this included Edinburgh (0.41), Alloa (0.50) and Peterhead (0.52); it appeared the least in Hamilton (0.02) and Cumnock (0.01). The difference in the magnitude of disciplinary actions between Hamilton and Wishaw appeared again when dealing with accidents - the average number at Hamilton was far lower than those at Wishaw - 0.37, a difference which continued through the range of actions.

Much less frequent was the incidence of written warnings. The mean for these overall was 0.05, with the range being from zero in some depots (Fraserburgh, Elgin, Peterhead and Cumnock), to 0.09 in Edinburgh, 0.12 in Paisley and 0.14 in Fort William. Final warnings were only used in three depots, with the range being from an average of 0.009 in Fort William to 0.10 in Paisley. Dismissal, followed by reinstatement after appeal, was an even less common outcome of an accident, occurring in only three depots - Edinburgh (average of 0.001), Peterhead (0.005) and Paisley (0.043). With accidents, dismissal is regarded as the last resort, and would only result if a driver had had several large accidents where he was to blame and could have avoided them, or for one very major accident. An example of this was one accident which happened to a Paisley driver: his bus skidded out of control (in the summer) and hit a wall. This caused £1,800 damage to the wall, £5,000 of damage to the bus, and the driver was dismissed, only to be reinstated on appeal. An accident of this magnitude is a rare occurrence.

These forms of action were fairly rare, however, and in second place to verbal warnings were periods of suspension with an overall average of 0.10. Two depots were well above average on this score; the remainder were well below. Paisley had the highest number of suspensions per driver of 0.29, and second was Edinburgh with an average of 0.19. Drivers at Hamilton and Hawick had no suspensions recorded against them, and the remaining depots ranged from means of 0.01 at Fraserburgh to 0.08 at Peterhead.

5.3.3 Status

The final measure to be considered in this section is the status of each driver approximately one year after the psychological tests were conducted. Although perhaps not a true measure of performance as such, it can still be included, even if just to identify those whose "performance" or abilities were exceptionally good or bad. The categories include those who are promoted to inspector (or above) and those who are dismissed.

The following table summarises the status of drivers one year after the tests were carried out.

Table 5.20

Status one year after sitting tests.

Status	Number	%
Still a driver	534	87.1
Still a depot controller	9	1.5
Shop steward	13	2.1
Since promoted	10	1.6
Since resigned	36	5.9
Since retired/deceased	4	0.6
Since dismissed	7	1.1
TOTAL*	613	100.0

* Percentages may not add to 100 due to rounding.

Nine-tenths of those tested were still in the same job a year afterwards, either as a driver, depot controller or shop steward. The largest proportion of the remainder had resigned, with only small numbers retiring or being either dismissed or promoted. All depots were similar in that the majority of drivers and depot controllers were still in the same position when the performance data were collected. Ten drivers had been promoted in this period, accounting for 1.6% of the sample population, with resignations being 5.9%. The greatest proportion of these were in Edinburgh (12.9%); apart from smaller depots where there were one or two, there were five resignations at Wishaw and three at Paisley.

The situation at Edinburgh would have been regarded as a norm (or even low) for the industry in the 1960s and 1970s, but it was very much the exception (certainly as far as this sample was concerned) and perhaps explains the preference of supervisors at that depot to use suspension in preference to dismissal. Dismissals and retirals were comparatively infrequent, and to the researcher's knowledge, there were no deaths. In several cases fraud (or attempted fraud) and bad absenteeism/lateness records were the cause of dismissals occurring; unfortunately, it was rarely possible to discover why people left of their own accord as their resignation letters tended to be very brief, with the reasons perhaps being explained verbally to their traffic supervisor. The employment situation in the smaller depots tended to be more stable than in the larger ones, where the scale of operations perhaps means inevitably there will be more ongoing labour turnover.

5.4 Tests of significance

Attention now turns to tests which determine whether the differences between sub-groups of data were statistically significant. In other words, this determines the probability that two groups of cases came from the same population as opposed to different ones. Students' t-tests were carried out by SPSS-X to investigate this, after the data had been assembled into appropriate sub-groups.

The t-test procedure calculated both the F-value and the t-test statistics. As Guilford and Fruchter (1973) recommend, if the F-test shows that the two samples have significantly different variances, then the t-test is questionable. Therefore, in this research, the t-test was ignored if the F-test had a significance level of $p=.05$ or greater. The variables reported in the sections below are those for which the variances between groups are significantly different, providing that the F-value is not significant.

5.4.1 Tested vs. untested groups

A number of t-tests were carried out to investigate the differences between those who took part in the research project and those who did not. This was to see how representative the tested group were as a sample from all drivers in the depots which were studied. This in turn was to help to determine how representative the research findings might be. The tests, therefore, were restricted to the performance data collected - 40 variables covering age, length of service, disciplinary offences, accidents and disciplinary actions for both, as well as the specific figures for average lateness, absence and weeks of cash shortage. Not only were the data analysed en masse, but they were also analysed for the sub-groups of those aged below/above 40 years, for those in small and large depots (with the dividing line being drawn at 100 drivers), and for each depot.

Very few variables were statistically different at a significance level of p=.05 or greater. Age was one of the main ones to differ, with the tested group being younger than the untested one. In some cases length of service was also significantly lower for the tested group. The following tables list these differences.

Table 5.21

T-tests for tested vs untested groups of drivers.

(a) All drivers

Variable	Tested group Mean	Tested group S.D.	Untested group Mean	Untested group S.D.	F Value	T Value	Prob
Age	39.83	10.50	42.99	10.77	1.05	-4.48	>.01
Ticket issue	0.42	0.68	0.29	0.63	1.18	2.68	.01
Interview/ instruction	0.29	0.64	0.19	0.61	1.11	2.29	.02
No Action (accidents)	0.34	0.59	0.23	0.62	1.12	2.72	.01

(b) Drivers over 40 years of age

Variable	Tested group Mean	Tested group S.D.	Untested group Mean	Untested group S.D.	F Value	T Value	Prob
Joining age	38.86	7.99	37.14	8.35	1.09	2.28	.02
Service	10.48	8.37	13.00	9.56	1.31	-2.93	>.01
Total colls	1.04	0.89	0.85	0.86	1.10	2.23	.03
No action	0.26	0.43	0.16	0.46	1.16	2.57	.01

(c) Drivers under 40 years of age

None

(d) Small depots (under 100 drivers)

Variable	Tested group Mean	Tested group S.D.	Untested group Mean	Untested group S.D.	F Value	T Value	Prob
Age	43.49	10.01	47.68	9.97	1.01	-3.22	>.01

(e) Large depots (over 100 drivers)

Variable	Tested group Mean	Tested group S.D.	Untested group Mean	Untested group S.D.	F Value	T Value	Prob
Age	38.58	10.38	41.28	10.55	1.03	-3.33	>.01
Ticket issue	0.49	0.75	0.35	0.69	1.14	2.42	.02
Interview/ instruction	0.38	0.72	0.25	0.70	1.07	2.35	.02
No action (accidents)	0.40	0.66	0.26	0.65	1.01	2.79	.01

(f) Individual depots

Variable/ Depot	Tested group Mean	Tested group S.D.	Untested group Mean	Untested group S.D.	F Value	T Value	Prob
Elgin							
Age	42.44	9.55	49.52	9.09	1.10	-2.42	.02
Service	7.76	6.43	17.52	9.22	2.05	-3.81	>.01
Not at fault (accidents)	1.03	0.49	0.67	.40	1.52	2.69	.01
Cumnock							
Age	43.04	8.62	48.05	9.58	1.24	-2.12	.04
Service	12.19	6.80	18.90	8.12	1.42	-3.52	>.01
Paisley							
Service	4.60	5.32	7.23	6.29	1.40	-2.77	.01
Hamilton							
Age	38.27	9.82	43.87	10.03	1.04	-2.90	>.01
Wishaw							
Age	37.97	9.48	42.19	10.68	1.27	-2.61	.01

There were no statistically significant differences between tested and untested groups at the remaining depots: Fraserburgh, Forres, Hawick, Fort William, Peterhead, Alloa and Edinburgh.

5.4.2 Specific sub-groups of data

(i) All cases

Further tests were carried out on two subdivisions of the data used in the subsequent analysis: under 40 years/over 40 years and those in small/large depots, with the division being at a size of 100 drivers. These t-tests involved comparing one part against the other (eg. large depots versus small depots) Cash shortages, in terms of weeks per year when a cash shortage was reported, appeared more frequently in this section. The results of the t-tests were as follows:

Table 5.22

T-tests for all drivers split by group.

a) "Age group"

Variable	Older group Mean	S.D.	Younger group Mean	S.D.	F Value	T Value	Prob
General carelessness	0.19	0.38	0.24	0.41	1.18	-2.07	.04
Miscellaneous accidents	0.07	0.17	0.05	0.17	1.05	1.92	.05
Cash shortages	19.48	14.64	22.26	13.78	1.13	-2.58	.01

b) "Depot group"

Variable	Larger group Mean	S.D.	Smaller group Mean	S.D.	F Value	T Value	Prob
Age	39.57	10.52	45.10	10.18	1.07	-7.20	>.01
Joining age	32.45	8.59	33.70	8.82	1.06	1.96	.05

ii) Tested only

T-tests were also carried out on the sample of drivers tested, again split by age group and depot size; this time both test and performance measures are included. The following were the variables where there was a statistically significant difference between groups.

Table 5.23

T-tests for tested drivers only, split by age group.

Variable	Younger group Mean	S.D.	Older group Mean	S.D.	F Value	T Value	Prob
WRT Right	24.74	9.97	17.58	9.90	1.01	8.79	>.001
CF1	8.42	2.24	7.06	2.48	1.23	7.04	>.001
CF2	7.01	1.91	6.28	1.71	1.25	4.85	>.001
CF3	8.44	2.06	6.85	2.20	1.13	9.13	>.001
CF4	5.25	1.83	4.40	1.91	1.09	5.54	>.001
CFT	29.12	5.95	24.62	5.92	1.01	9.23	>.001
16PF - C	14.70	4.10	13.70	3.96	1.07	2.96	>.001
- E	12.07	3.91	10.74	3.95	1.02	4.04	>.001
- F	13.83	4.73	11.96	4.25	1.24	4.95	>.001
- G	11.89	3.32	13.45	3.19	1.09	-5.72	>.001
- Q1	9.97	3.28	8.75	3.14	1.09	4.54	>.001
- Q3	12.30	3.27	13.35	3.13	1.09	-3.91	>.001
Cash shortages	18.63	14.44	22.63	14.11	1.05	-2.96	>.001

It is perhaps not surprising that there were significant differences between the two groups in terms of intelligence test scores, on account of age being an important determinant of intelligence test performance. In terms of the 16PF factors, the indications are that the older drivers were less emotionally stable (C), more humble and mild (E) and more sober and serious (F) than the younger ones. They also had higher standards, were more conservative and more tolerant of traditional difficulties (G,Q1 and Q3).

Table 5.24

T-tests for tested drivers only, split by depot group.

Variable	Larger group Mean	Larger group S.D.	Smaller group Mean	Smaller group S.D.	F Value	T Value	Prob
WRT Right	22.22	10.63	19.52	9.99	1.13	-2.77	.01
WRT wrong	4.07	3.22	3.53	2.84	1.29	-1.88	.06
CF3	7.84	2.28	7.40	2.19	1.09	-2.08	.04
CFT	27.36	6.42	26.25	6.06	1.12	-1.89	.06
16PF - B	7.25	1.93	6.86	1.84	1.10	-2.12	.03
- C	14.45	4.09	13.72	3.85	1.13	-1.90	.06
- M	11.51	3.42	10.06	3.25	1.11	-4.51	>.01
- N	10.67	3.11	11.76	3.26	1.10	3.64	>.01
- O	11.59	4.17	12.69	4.09	1.04	2.78	.01
- Q1	9.66	3.27	8.73	3.19	1.05	-3.01	>.01
Age	38.58	10.38	43.49	10.01	1.08	-5.10	>.01
Joining age	32.04	8.71	33.83	8.72	1.00	2.18	.03

There was a small difference between the two sizes of depots in terms of intelligence: the significance level was marginal for Culture Fair total and so was included in the table. Interestingly, factor B was significantly different here: it was not so in the other case discussed above.

Those in the larger depots were slightly higher in terms of imagination and thought (M) and in a questioning attitude (Q1); they were more forthright and unpretentious (N) and were less worried and apprehensive (O) than those in the smaller establishments.

5.5 Summary

This chapter has examined the data collected in the research at a descriptive level, providing frequencies, means and standard deviations. A section was also devoted to the differences between sub-groups of the data, most importantly (for the eventual application of the results) between those who took part in the project and those who did not. Few significant differences were found, mostly those of age, length of service and some offences. A number of differences were discovered between young and old drivers, and between those in large and small depots. These will be further explored in the factor analysis chapter.

CHAPTER SIX

RESULTS (2) : CORRELATIONS BETWEEN VARIABLES

6.1 Introduction

This chapter describes the results of correlational analyses performed on the data. Pearson product-moment correlations were calculated using the "Pearson Corr" procedure on SPSS-X. A number of analyses were performed, of the biographical and psychological test data (the inputs), the situational variables (the treatments) and the performance criteria (the outputs).

A large number of correlation matrices were produced, many containing considerable numbers of correlations with significance levels greater than p=.01. The full matrices, reduced and photocopied from the original computer printout, are given in Appendix C. The matrices shown in this chapter are edited to show just the statistically significant correlations. To simplify presentation of these matrices, it is assumed that all correlation coefficients are in the range -99 to 99, hence nonsignificant zeros and decimal points are ommitted to ease clarity. A coefficient of +0.32 is entered as 32, for example; one of -0.14 is expressed as -14. In the tables the significance level of coefficients is abbreviated to "**" for those where p=.01 or greater, "*" for those where the significance is between p=.01 to p=.05. Correlation coefficients which are not statistically significant at p=.05 or greater are indicated by a dash (-) in the tables.

This chapter first examines the intercorrelations amongst groups of variables, then explores the correlations between different groups. The variables were described in detail in the research methodology chapter.

6.2 Intercorrelations

6.2.1 Biographical and situational variables

The table below shows the intercorrelations amongst the biographical variables for each driver - current age, age on joining, length of service, the number of years a car licence was held prior to joining the bus company and the number of previous jobs the driver has held in the five years before joining. In addition, the size of depot each driver works in (measured by number of drivers employed there) and the distance that depot is from the headquarters of its company were also entered into the analysis.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Age	-						
(2) Joining age	75**	-					
(3) Service	56**	-13**					
(4) Car licence	78**	87**	-	-			
(5) Previous jobs	-09*	-10*	-	-10*			
(6) Depot size	-18**	-10**	-13**	-20**	-		
(7) Distance HQ	18**	13**	11**	21**	-	-79**	-

There was a fairly wide range of correlation coefficients, from very high (eg, age and service; depot size and distance from head office) to very low and not significant. Most of the relationships were self-explanatory from what was described in the previous chapter. The older drivers tended to be longer serving than the younger ones and tended to work in the smaller depots. Similarly, the larger the depot, the lower the average age and average length of service. In terms of the depots themselves, the smaller ones tended to be located further from their company head office than the larger ones.

Age and age on joining were positively related - this implies that the older drivers were quite old when they joined their depot; age on joining increased as depot size decreased, which makes sense when one considers that a greater proportion of older drivers tended to be employed in the smaller establishments. The number of years a car licence was held prior to employment with the bus company was positively linked to joining age - again this was understandable as those older on joining were more likely to have possessed a licence for longer. Age on joining and service were negatively correlated, implying that those who have been with their depot for a shorter time were older when they joined. This would appear to contradict the positive relationship between age and service.

Number of previous jobs correlated negatively with both current age and age on joining: the drivers both who are younger now and were younger when they joined held more jobs in the five years prior to joining, and had possessed a car licence for a shorter period of time. This may well be a reflection of the labour market in the early 1980s, with both large scale redundancies in major industries (such as steel and engineering in the Hamilton/Wishaw and Paisley areas) and a lack of employment opportunities for school leavers, in these areas especially. Those who were unemployed have often just taken any job that was available. Such jobs (from reading application forms at the three depots listed above in particular) were frequently short term in nature, either because they were only temporary, or were subject to redundancy, or the person left owing to a better job being available elsewhere. This helps to explain the relationships between previous employment and both age measures.

The opposite is often the case at the other end of the scale, a number of drivers who were older when they joined had often come from either long service in one of the armed forces, or from a long period of continuous employment with one firm (perhaps being made redundant). Such persons are often welcomed by supervisors who recruit, as they believe that a long period of stable employment encourages people to stay with the company.

6.2.2 Word Recognition Test and Intelligence Test items

The table below gives the intercorrelations among the intelligence test items and the Word Recognition Test (WRT). "WRT" refers to total number of words correct on the this test; "risk" to number of words wrong. "CF1" to "CF4" refer to the four subtest scores on the Culture Fair test, "CFT" to the total. "B" is the raw score from factor B on the 16PF, which represents intelligence.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) WRT								
(2) Risk	-							
(3) CF1	39**	-						
(4) CF2	33**	-	39**					
(5) CF3	45**	-08*	52**	41**				
(6) CF4	32**	-	39**	30**	41**			
(7) CFT	50**	-	80**	68**	79**	68**	-	
(8) B	32**	-	29**	22**	34**	23**	37**	-

The results were more or less as would be expected. The individual sub-tests and the total of the Culture Fair test were highly intercorrelated, as they should be for any group of people with an average range of ability taking it. "WRT" was also highly correlated with intelligence (as measured by the two other tests), the highest correlations being with sub-test 3 and overall total for Culture Fair. "Risk", the number of words answered incorrectly on the Word Recognition Test, was the one variable which did not correlate significantly with any of the intelligence ones, although Ingleton (1986) does not claim that it should.

On account of the high correlation coefficients amongst the subtests of the Culture Fair, all future references to this test will contain only the total score. The data above provided further evidence for the link between the Culture Fair test (on a measure of "g", general intelligence) and factor B on the 16PF - the two have a significant positive correlation (as noted by, for example, Ajwani, 1982).

Of the four subtests of Culture Fair, it was the third which had the highest correlation coefficient with WRT and the only one (negative) with Risk. The subtest asks people to complete matrices, where one sector is missing; the WRT asks people to complete words which have not been printed properly. It is purely a matter for speculation at this stage as to whether there is any meaning in these relationships: those who are good at making sense of incomplete words also achieve a high score when solving incomplete matrices. Those who answer a high number of words incorrectly on WRT are less likely to be able to complete matrices, either through omission or commision. As the correlation with risk and CF3 is very small, it is perhaps unwise to read too much into it.

6.2.3 Intercorrelations among 16PF items

Three-quarters of the correlation coefficients in this matrix were significant at p=.05 or greater, 79 out of a total of 105 pairs with factor B being excluded as it receives more detailed treatment elsewhere. No further discussion of this matrix will take place, as the correlations amongst the 16PF factors are best left to the factor analysis discussed in the next chapter.

6.2.4 Correlations between 16PF and intelligence test items

The next table summarises the statistically significant correlations for the above. Factor B on the 16PF is included with the intelligence test items, as in the previous section.

Factor	WRT	Risk	CFT	B
A	-	-	-14**	-10**
C	09*	-10**	10**	-
E	07*	07*	16**	-
F	10**	-	13**	-
G	-	-08*	-	-
H	-	-	-	-
I	-	-	-17**	-12**
L	-09**	-	-11**	-
M	11**	-	12**	13**
N	-12**	-10**	-11**	-08*
O	-14**	09**	-11**	-10**
Q1	-	-	-	-
Q2	-	-	-	08*
Q3	-	-	-	-
Q4	-	10*	-	-

Only three personality factors (M, N and O) correlated with all three intelligence items - WRT, Culture Fair total and factor B. A further five correlated with WRT and CFT and another two with CFT and B. Risk correlated significantly with six personality factors. No factor correlated with all four test variables. The highest correlation coefficients tended to involve CFT; the lowest, risk. Three personality factors had no significant correlations with any test items - H (shy/venturesome), Q1 (conservative/questioning) and Q3 (lacks/has self-control).

M was positively related - a high score represents those who are imaginative, creative, absorbed in ideas and often oblivious of people. These people tend to be thinkers which may well help explain the positive correlations with intelligence. The other two were negatively correlated. Low N describes spontaneous, forthright, natural and trusting behaviour. In some respects it is strange that such individuals should have high intelligence. Cattell et al (1982) report that the groups which score highest on these factors include the skilled professions and precision occupations, such as time study engineers, accountants and electricians. They also tend to be intellectual and analytical of both their own selves and of others' motives. It would appear that a high score might represent academic intelligence, which is not necessarily what these tests measure. On the other hand, the lack of both social polish and a hard-headed approach to people (both features of high N), combined with genuine liking for people (low N), may explain the high correlation with WRT, which Ingleton

(1987) postulates measures "social intelligence" - a capacity to deal with people. Low scores on factor O are associated with self-assured, confident, expedient behaviour: it could be that their intelligence makes them cope with what they might regard as the minor frustrations of bus driving and keep them in perspective. Those with low intelligence, who score high on O, may become over-anxious about the everyday problems and difficulties of the job.

A number of other factors correlated with at least two of the intelligence items, some of the highest coefficients being for factor I. These were negative, suggesting that the more intelligent have low scores on this factor, in other words are more tough- than tender-minded, realistic, down to earth and independent. It may well be that their practical approach to life made it easier for them to solve the intelligence tests which required choice of the most straightforward answer. It is harder to account for the high positive correlation with factor E and Culture Fair, high scores on this factor representing assertive, competitive and self-assured behaviour. Possibly, these peoples' intelligence makes them more assertive in the situation of a bus company, where they might be intolerant of situations where they can see better ways of doing things but where the system makes it hard for them to put forward their suggestions in a light that will be seen as constructive and as insolence.

Two factors correlate only with the number of words wrongly answered on the WRT only, the variable which it is postulated measures unconscious risk. G correlates negatively: this makes some sense in that low scores on this factor describes expedient individuals who disregard rules, are irresponsible and not conscientious. On the WRT candidates are warned not to guess if they are unsure of an answer - it may be these individuals did. Q4 correlated positively - a high score represents frustration and tension. This might have been felt by those who were unable to see many words in the test, and started guessing in order to be able to put at least some words down, so as not to be embarrassed in the eyes of their colleagues. C, N and O also correlate with WRTwrong, a low score on C suggesting a lack of tolerance for frustrating conditions and easily annoyed.

6.2.5 Correlations between WRT/intelligence and background variables

The next table shows the correlations between the WRT and intelligence items, and the biographical/situational variables.

Age had a strong, negative relationship with both WRT and Culture Fair: as one gets older, one's ability to do these tests diminishes. There was no significant link between age and B and a small one with Risk (positive). Length of service, car licence and age on joining followed a similar pattern, not surprising as the longer-

	WRT	Risk	CFT	B
Age	-37**	08*	-42**	-
Join age	-23**	07*	-28**	-
Service	-27**	-	-28**	-
Car licence	-27**	-	-29**	-
Previous jobs	10*	-	-	-
Depot size	14**	06*	11**	12**
Distance HQ	-07*	-	-	-07*

serving drivers will almost certainly be the older ones. The same applies to the car licence variable. Number of previous jobs had just one statistically significant correlation with one intelligence item - WRT. Depot size was positively correlated with all four variables; distance from headquarters was negatively correlated with two of them.

6.2.6 Correlations between 16PF and background variables.

The statistically significant correlations between these two groups of variables are summarised below. Age, joining age, service and, to some extent, car licence go hand in hand in terms of direction of correlations, although the size of the coefficients sometimes varied. Previous jobs had only three correlations with test factors. Size of depot and distance from head office correlated significantly with around half of the factors; in only one case did they both have coefficients in the same direction - factor N.

Background/situational variable

Factor	Age	Join age	Service	Car lic	Prev jobs	Depot size	Distance from HQ
A	-		-	-	-	-09*	07*
C	-12**	-08*	-07*	-	-	08*	-08*
E	-19**	-08*	-18**	-15**	-	-	-
F	-27**	-14**	-22**	-19**	-	-	-
G	25**	22**	09*	25**	-	-10**	08*
H	-	-	-09*	-	-09*	-	-
I	13**	09*	07*	09*	11*	-	-
L	-	-	-	-	-	-	-
M	-	-	-	-	-	20**	-12**
N	13**	-	18**	11**	-08*	17**	15**
O	09**	-	09*	-	-	-10**	09*
Q1	-19**	-11**	-15**	-14**	-	09**	-18**
Q2	09**	-	07*	08*	-	-	-
Q3	18**	13**	09**	17**	-	-	-
Q4	-	-	-	-15**	-	-	09**

Several factors had fairly high correlation coefficients with the age-related variables, among them factors E and F - this suggested that with greater age drivers become both more conforming and humble and have a more sober and serious outlook on life. In addition, older drivers would appear to be more conscientious, conforming and controlled (G, Q3), more shrewd and less natural (N) and more conservative and traditional (Q1). Two other factors correlated strongly with just age - these are C (greater age bringing less emotional stability and low frustration tolerance) and I (greater age with this factor making for a more tough-minded, no-nonsense and realistic approach to life).

The effect of age on these 16PF scores can be compared with other research findings, as summarised by Cattell _et al_ (1982) who report that age can affect seven of the sixteen scales. The findings here contradict these to some extent. Four factors in the driver research follow Cattell _et al_'s pattern, namely a decline in F, and a rise in G, I and Q3. However, Cattell _et al_ suggest that O should fall (it rises with the drivers), Q1 should rise steadily (it falls significantly) and Q4 should fall (the correlation with age is not significant; with car licence, however, it does fall significantly). In addition, from his own research, Cattell suggests that C rises moderately with age (the opposite is the case here) and that E falls for women only (it falls in this research, where almost all the respondents were men). He also suggests that H and M rise for men and L falls - none of these were significant here.

Looking at the situational variables, factors M and N had the highest coefficients. This suggests that in the larger depots, and those nearer their company head office, drivers are more self-motivated and creatively imaginative (high M). In both larger depots and those further from head office, drivers are more shrewd, socially aware and calculating (high N). This is also a feature of older drivers: as there tend to be more in the more rural depots (such as Fort William, Peterhead and Elgin) this might account for the positive correlation with the distance variable. There was also a fairly high coefficient of correlation between this variable and factor Q1, implying that the more traditional and conservative drivers are found in depots far away from their company headquarters. This is backed up to some extent by the correlations with G, scores on which fall as depot size increases and distance decreases.

6.2.7 Summary

A number of brief remarks can be made on the basis of the correlations presented so far. The older drivers tend to be longer serving (although some were older when they joined) and tend to be located in the smaller depots, which are further from company headquarters than the larger ones. The more intelligent drivers tend to be younger with shorter service and are employed in larger depots. There were a fairly large number of significant correlations between the 16PF and both intelligence and biographical and situational variables.

6.3 Intercorrelations between performance measures

6.3.1 Offence variables

The next table shows the correlation coefficients for the "offence" variables, which were discussed in some detail in the research methodology chapter. To recap briefly, the "offence" data was collected both from drivers' individual records (items 1 to 10 below, each expressed as an average number per year) and from depot records (unauthorised absence, lateness in reporting for work and cash shortages - average number of days per year for the first two, average number of weeks per year for the third). The final variable is the sum of the first ten.

There was, in general, positive intercorrelations amongst these variables. Some were particularly high, for example between poor timekeeping and ticket issuing faults, poor timekeeping and excessive absence, and poor timekeeping and excessive cash shortages; and number of complaints with each of failure to stop and uplift, rudeness and poor quality of driving. The last three are not particularly surprising, as these often are the main causes for complaint by members of the public. There were very strong correlations between the summary variable (total disciplinery offences) and most of the individual measures, the two exceptions being average lateness and average cash shortages. This is hardly surprising as the individual measures (numbered 1 to 9 in the table) were added together to produce the total offences category.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	-													
2	34**													
3	28**	30**												
4	14**	15**	-											
5	27**	28**	22**	14**										
6	22**	12**	-	15**	12**									
7	23**	-	-	16**	22**	08*								
8	15**	-	-	07*	23**	-	37**							
9	08*	-	07*	-	10**	-	08*	07*						
10	24**	26**	47**	40**	22**	30**	-	-	-					
11	11*	-09*	-	-	-	-	30**	25**	-	-				
12	19**	24**	11*	13**	14**	08*	35**	16*	-	-	23**			
13	-	-19**	-	-14**	-	-	10*	33**	-	-10*	31**	-		
14	65**	62**	48**	31**	59**	24**	47**	56**	15**	15**	34**	-	-	

Notes

** = significant at p=.01 or greater
* = significant in range p=.05 to p=.01.

Codes:
Disciplinary records:

1. Poor timekeeping
2. Ticket issuing faults
3. Failure to stop
4. Rudeness
5. General Carelessness
6. Poor quality of driving
7. Excessive absence
8. Excessive cash shortages
9. Miscellaneous
10. Complaints

Other records

11. Unauthorised absence (days per year)
12. Lateness for work (days per year)
13. Average cash shortages (average weeks in which shortage reported).
14. Total disciplinery offences

6.3.2 Accident variables

Accident data were collected in two ways. Firstly, there were counts of each type of accident for each driver, averaged to a figure per year. Secondly, the accidents were totalled under two headings - collisions and non-collisions. Taking the individual accident variables, there were few significant correlations between them as the table on the next page shows.

There were only two significant intercorrelations amongst the collision categories - collisions with vehicles correlated with collisions with pedestrians and collisions with animals correlated with collisions with objects. Amongst the few significant correlations for non-collision accidents were those between boarding/alighting accidents and accidents aboard buses; and the correlation between the two types of vandalism - that occurring outside (such as a stone thrown at a window) and that taking place inside (for example, a seat covering being cut with a knife). [This gives rise to the suggestion that some drivers may be more vandalism prone than others.]

As with the offences (see previous section) the two summary variables had very high correlations in many cases with the individual categories; they also had a fairly high degree of intercorrelation. This suggests that drivers are more likely to have both collision and non-collision types of accident in roughly equal

	1	2	3	4	5	6	7	8	9	10
1	-									
2	18**									
3	-	-								
4	-	-	34**							
5	-	-	-	24**						
6	35**	-	-	25**	25**					
7	-	10**	-	-	-	-09*				
8	-	-	-	-	-	-	35**			
9	-	-	-	-	07*	-	-	-		
10	88**	27**	24**	46**	07*	39**	08*	-	-	
11	19**	07*	-	20**	37**	44**	74**	46**	18**	24**

Notes

** = significant at p=.01 or greater
* = significant in range p=.05 to p=.01.

1. Collisions - vehicles
2. Collisions - pedestrians
3. Collisions - animals
4. Collisions - objects
5. Boarding and alighting accidents
6. Accidents aboard bus
7. Vandalism - outside
8. Vandalism - inside
9. Miscellaneous accidents
10. Average collisions
11. Average non-collisions

proportion than to have a preponderance of one or the other. In turn, this supports the accident-proneness theories that suggest that some people are more likely to have accidents than others. This was discussed in the literature review chapter.

6.3.3 Correlations between discipline and accident records

There were a number of intercorrelations between offence and accident variables, which lead to the suggestion that a poor record in one area may be matched by a poor record in the other.

Collisions with vehicles had the highest number of significant correlations with offence variables - ten out of the fourteen. The coefficients ranged from r=-.10 for cash shortages to r=.39 for timekeeping. Average cash shortages correlated negatively with collisions with vehicles and also with accidents aboard buses, but positively with five other accident categories. In similar vein, the summary variable, average collisions, correlated significantly with seven of the thirteen disciplinary categories, including failure to stop, general carelessness, complaints and quality of driving. Four of the six accident variables which correlated with ticket issuing were also negative - boarding/alighting accidents, both categories of vandalism and miscellaneous. Interestingly, for these categories drivers are most often found to be the victim of circumstances and not at fault.

Accident category

Dis Cat	1	2	3	4	5	6	7	8	9	10	11
1	39**	-	-	-	-	29**	-	-	-	33**	11**
2	35**	-	-	-	-08*	21**	-15**	-08*	-11**	31**	-07*
3	14**	08*	-	-	-	19**	-	-	-07*	12**	-
4	-	-	-	-	-	08*	-	-	-	-	-
5	12**	07*	-	09**	-	-	-	-	-	14**	-
6	11**	-	-	-	-	-	-	-	-	09**	-
7	-	-	-	-	-	-	-	09*	-	-	-
8	-07**	-	-	-	-	-	10**	12**	-	-	10**
9	-	-	-	-	-	-	-	19**	-	-	-
10	12**	-	-	-	-	16**	-08*	-	-	12**	-
11	-	-	-	-	-	-	-	-	-	-	-
12	10*	-	-	09*	13**	-14**	-	-	-	11*	-
13	-10*	-	10*	-	10*	-25**	30**	09*	09*	-	24**
14	26**	-	-	-	-	19**	-	-	-11**	24**	-

Notes

** = significant at p=.01 or greater
* = significant in range p=.05 to p=.01.

Offences:

1. Poor timekeeping
2. Ticket issuing faults
3. Failure to stop
4. Rudeness
5. General carelessness
6. Poor quality of driving
7. Excessive absence
8. Excessive cash shortages
9. Miscellaneous offences
10. Complaints
11. Average absence
12. Average lateness
13. Cash shortages
14. Total offences

Accidents

1. Collisions - vehicles
2. Collisions - pedestrians
3. Collisions - animals
4. Collisions - objects
5. Boarding/alighting accidents
6. Accidents aboard bus
7. Vandalism - outside
8. Vandalism - inside
9. Miscellaneous accidents
10. Average collisions
11. Average non-collisions

6.3.4 Correlations involving disciplinary actions for "offences"

The table below shows that these are fairly highly intercorrelated.

	Interview/ instruction	Verbal Warning	Written Warning	Final Warning	Suspension
Interview/ Instruction	-				
Verbal Warning	-				
Written Warning	18**	22**			
Final warning	-	28**	40**		
Suspension	27**	27**	37**	45**	
Dis/reinstatement	-	-	69**	16**	09*

The general trend would appear to be that the worse the level of disciplinary action, the less likely it is to be correlated with disciplinary actions at the other end of the scale, and vice versa. "Verbal warnings", for example, only correlated as far up the hierarchy as "suspensions"; "dismissal then reinstatement" only with "written warnings" and above. The exception is "suspensions", which correlated with all other variables. This suggests that there may be drivers who have nothing worse than "verbal warnings" on their records; there may also be drivers with predominately "written" and "final warnings", "suspensions" and "dismissals" on their records, and very few mere "interviews" and "verbal warnings".

Taking next the relationships between offences and disciplinary actions for those offences, there is not unsurprisingly a great number of significant correlations. Virtually all are positive, implying that the higher the number of offences, the higher the number of "actions". There are one or two exceptions to this, however. Interview and instruction correlated r=-.14 with average number of days of unauthorised absence, r=-.28 with average weeks of cash shortages, and r=-.14 for disciplinary interviews for excessive cash shortages. This implies one (or both) of two things, firstly that drivers who have greater absenteeism and cash shortages have fewer interviews and instructions for disciplinary offences, and/or secondly, that these drivers are likely to receive a worse level of disciplinary action than a mere interview. Dismissal then reinstatement only correlated with four variables - poor timekeeping, ticket issuing faults, excessive absenteeism and miscellaneous offences - which suggests that these are the only offences serious enough in most circumstances to warrant dismissal. The other offences do not consistently attract this option.

6.3.5 Correlations involving disciplinary action for accidents

Overall, there were far fewer significant correlations amongst disciplinary actions for accidents, and between them and the accident variables, than there were for offences. The table overleaf illustrates these. "Not at fault" correlates with "no action" and those at the more serious level, but not with those in the middle ("verbal" and "written warnings"). "Final warnings" has a very high correlation with "suspensions", suggesting that those who have high numbers of the former have also received high numbers of "suspensions".

	Not at fault	No action	Verbal Warning	Written Warning	Final Warning	Suspension
Not at fault	-					
No action	09**					
Verbal Warning	-	-				
Written Warning	-	-	-			
Final warning	32**	-	-	-		
Suspension	27**	-	08*	-	85**	
Dis/reinstatement	08*	-	-	-	-	-

Moving to the correlations between disciplinary action and collision accidents, those with vehicles consistently correlated with most of the action variables except "dismissal-then-reinstatement", with coefficients as high as r=.59 (p=.00). Collisions involving pedestrians only correlated with two variables ("not at fault" and "no action"), collisions with animals with "not at fault", "verbal warnings" and "dismissal then reinstatement". Collisions with objects correlated with all actions except "written" and "final warnings". One possible reason for the high correlations with collisions with animals and collisions with objects is that there is perhaps less scope for a driver to be "innocent" if he collides with inanimate objects (such as posts, walls, gates) and with animals, than there is when dealing with pedestrians (often under the influence of alcohol) and other road users. Of the two summary categories, total collisions correlated with all action variables (from r=.18 for "dismissal then reinstatement" to r=.53 for "suspensions"); total non-collisions correlates very highly with "not at fault" (r=.84) and less so with "no action" (r=.18), "final warnings" (r=.22) and "suspensions" (r=.18).

Comment has been made earlier of the likelihood of drivers being not held responsible for events outwith their control (such as vandalism) but sometimes being to blame for situations where on first sight they may have had little influence (such as accidents aboard buses). The relationships found here bear this out, to some extent. External vandalism correlated positively with the first two action categories - not at fault (r=.62) and no action (r=.21) - and negatively with the third (verbal warnings) at r=-.16. The only significant correlation with internal vandalism was r=.35 with not at fault. In similar vein, drivers are sometimes held responsible for passenger accidents aboard their vehicles, where a sudden movement (eg. sharp swerving or braking) has caused someone to fall off their seat and be hurt. The correlations illustrate this: numbers of passenger accidents correlated r=.40 for not at fault, r=.18 for verbal warning, r=.47 for final warning and r=.53 for suspensions. There were fewer correlations for boarding and alighting accidents: r=.31 for not at fault and r=.15 for verbal warnings.

6.3.6 Correlations between actions for both accidents and "offences"

The table below gives the statistically significant correlations for the two groups of disciplinary action variables. "Not at fault" only applied to accidents and hence is not given in the offence group; "interview/instruction" for offences equates to "no action" for accidents.

Disc. action for accidents	Disciplinery action for offences: Int/ instr.	Verbal warning	Written warning	Final warning	Susp.	Dism/ reinst.
Not at fault	-17**	-	19**	-	-08*	33**
No action	38**	-	-	-	-	-
Verbal warning	23**	14**	11**	12**	13**	-
Written warning	11**	-	-	-	-	-
Final warning	-	-	61**	-	-	88**
Suspension	07*	-	64**	-	11**	83**
Dism/reinst.	-	-	-	-	-	-

There were a fairly high number of correlations between the two groups which were significant. As might be expected, there was a negative correlation between "not at fault" for accidents and "interview/instruction" for offences, as the former implies no blame and the latter some blame. It was not always the case that an accident action variable correlated with the same action for offences (eg, "verbal warnings" for accidents and "verbal warnings" for offences) - "written" and "final warnings" and "dismissal then reinstatement" did not correlate significantly between offences and accidents. Some of the highest correlation coefficients were found with "written warnings" (for offences): with "final warnings" and "suspensions" for accidents; also "dismissal then reinstatement" for offences had very strong correlation coefficients with "final warnings" and with "suspensions".

6.3.7 Summary and overall comments

A few comments will be made at this stage to summarise and evaluate some of the correlations involving performance measures found so far, before moving on to discuss the correlations between the predictors (biographical, situational and psychological test data) and the criteria (offence and accident data). Taking the offence variables first, there is a high degree of intercorrelation amongst them which in most cases is positive. This suggests that the more offences a driver has "committed" in one category, the more he will have committed in another. The exceptions to this are discussed below. There is a lesser extent of intercorrelation amongst the accident variables, although the coefficient of r=.24 between total collisions and total non-collisions gives rise to the suggestion that some drivers may be more "accident-prone" than others. The majority of the correlations between offence and accident variables are positive, which in turn leads to the suggestion that a poor accident record is likely to be matched by a poor offence record. The pattern of correlations amongst disciplinary action variables seems to mirror the pattern for the actual offence and accident variables to which they relate. There is therefore a fairly high degree of intercorrelation between disciplinary actions for offences and a fairly low degree for disciplinary actions for accidents, with quite a high number of correlations between the two categories.

Cash shortages (average weeks per year) has some interesting relationships with other variables. One of these is the negative one with ticket issuing offences - the higher one is, the lower the other. Commonsense might suggest that the two should be positively related: the more likely a driver is to issue a wrongly printed ticket (through accidently entering the wrong details into the ticket machine) the more likely he is to be inaccurate in looking after his cash (either collecting fares and giving change, or in counting up takings at the end of the day). An alternative explanation is that there may be some drivers who take a chance by issuing tickets for the wrong value (they charge the passenger the correct fare, but print a lesser amount on the ticket, thus keeping the difference) but who take extra care to cash-in correctly. The takings are always counted by the cashiers at each depot; there is less chance of an inspector boarding a bus and finding a wrongly printed ticket. Average cash shortages also correlates negatively with collisions with vehicles and with accidents aboard buses, but positively with five other accident categories (collisions with animals, boarding and alighting accidents, both types of vandalism and miscellaneous accidents). All but the first of the latter group usually result in the driver being not blameworthy; with both the accidents in the former group the driver is often to blame. This suggests that drivers with low cash shortages have more accidents where they are to blame.

Accidents aboard buses is another variable to have some interesting correlations with other variables. In this study it is in the non-collision category, where drivers are most often found to be the victim of circumstances and not at fault. Accidents on board buses, whilst often falling into this category, sometimes resulted in the driver concerned being disciplined in, for example, cases where he braked too severely for the situation and perhaps caused a passenger to fall off their seat and be injured. [These injuries often appear to be slight, from reading accident report forms, but both legislation and company rules insist they have to be recorded.] This type of accident correlated positively with collisions with vehicles, which implies that these drivers are perhaps less carefull than others. Accidents aboard buses also correlated positively with six disciplinary variables: poor timekeeping, ticket issuing faults, failure to stop, rudeness, number of complaints and total offences. The coefficients range from .08 to .29, all but one significant at p=.00. This variable also has some very high correlations with disciplinary action variables, both with "not at fault" (r=.40) and with some of the at fault categories, ranging from r=.18 for "verbal warning" to r=.53 for "suspensions". This implies that drivers who have high numbers of accidents aboard their buses are also likely to have a poor disciplinary record (and have received harsh punishments).

This in turn suggests that this category of accident is as likely to result in blame as to result in no blame. There were fewer correlations for boarding and alighting accidents: r=.31 for "not at fault" and r=.15 for "verbal warnings". By contrast, external vandalism correlated positively with the first two action categories - "not at fault" (r=.62) and "no action" (r=.21) - and negatively with the third ("verbal warnings") at r=-.16. This implies that those suffering attacks of vandalism on their vehicles are less likely to be at fault for accidents.

6.4 Correlations between predictors and criteria.

6.4.1 Biographical/situational variables and performance

The following table summarises the number of statistically significant correlations between the background variables and the offence (offences and disciplinary actions) and accident variables (accidents and disciplinary actions). In almost all cases there were at least as many correlations, if not more, for the offences than for the accident variables.

Variable	Age	Joining age	Service	Car lic.	Prev jobs	Depot size	Dist. from HQ
Offences:							
Poor timekeeping	-16**	-	-16**	-12**	-	21**	-14**
Ticket issuing faults	-07*	-	-16**	-	-	36**	-14**
Failure to stop	-11**	-	-14**	-	-	24**	-15**
Rudeness	-	-	-	-	-	19**	-
General Carelessness	-09**	-07*	-	-15**	14**	13**	-
Poor quality of driving	-	-	-	-	-	09**	-
Excessive absenteeism	-	-10**	-	-11*	14**	09*	-10**
Excessive cash shortages	-11**	-07**	-07*	-11*	-	-	-11**
Total offences	-18**	-	-20**	-15**	09*	31**	-21**
Number of complaints	-10**	-	-13**	-09*	-	24**	-14**
Lateness (days)	-20**	-	-24**	-	-	26**	-18**
Absenteeism (days)	-21**	-12**	-17**	-19**	-	-	-14**
Cash shortages (weeks)	-11**	-	-17**	-	-	24**	17**
Verbal warnings	-15**	-08*	-12**	-16**	-	12**	-11**
Suspensions	-	-	-09**	-	-	21**	-12**
Accidents							
Collisions - vehicles	-11**	-	-20**	-	-	14**	-12**
Collisions - people	-	-	-	-	-10*	08*	-
Collisions - animals	-	-	-07*	-	-	-	-
Collisions - objects	-14**	-	-14**	-11**	-	-	-
Total collisions	-16**	-	-24**	-	-	14**	-11**
Boarding/alighting	-08*	-	-09*	-	-	-	-
Accidents aboard bus	-12**	-	-11**	-	-	10**	-11**
Vandalism (outside)	-11**	-	-13**	-	-	15**	-21**
Vandalism (inside)	-	-	-	-	-	-	-08**
Miscellaneous	-	-	-	-	-	-20**	29**
Verbal warnings	-	-	-17**	-	-	-	-
Suspensions	-07*	-	-	-	-	08*	-08*

The general pattern was for age and service to be negatively correlated with performance variables, and for depot size to be positively correlated. Distance from headquarters was negatively correlated. Car licence tended to mirror age and service, for reasons discussed earlier. Joining age was also negatively correlated, although it had far fewer correlations than either age or service. The variable with the fewest correlations was number of previous jobs.

The patterns above underlie the trend described in the previous chapter, when it was mentioned that those in larger depots tended (on average) to have worse discipline and accident records. In addition, the older drivers and those with longer service have better records (in terms of fewer offences and accidents) than those who are younger and have less service. This suggests not only an age effect but also a learning effect - more experienced drivers incur fewer disciplinary actions and have fewer accidents.

The few significant correlations which exist between number of previous jobs and offences are all positive (with general carelessness, excessive absenteeism and total offences) which suggests that the more jobs a person has held in the five years prior to joining his bus company, the more likely he is to be disciplined. This in turn might suggest that those who drift between jobs fairly frequently make less satisfactory drivers than those who have a more stable pattern of previous employment. Interestingly, the reverse is true for the only accident variable this correlates with - collisions with pedestrians.

Collisions both with vehicles and with people correlated positively with size of depot. This suggests that these accidents are more likely to occur in busier urban areas (the four large depots are all situated in major conurbations). A possible reason for this is that in urban areas there are more cars and people around than in the country; consequently, bus drivers may be more likely to collide with other vehicles and people there than with objects or animals. The opposite of this might be the case in rural areas, where a lesser proportion of vehicles and people may mean that drivers working at the smaller, country depots (such as Fraserburgh, Forres and Hawick) may have more accidents with objects and animals.

One of the few exceptions to the rule of distance from head office being negatively related to worse performance is for average weeks of cash shortages, where it is positive. Another exception to the general trends with the situational variables is the negative correlation between depot size and miscellaneous accidents: this may well be due to the unusually large number of smashed windscreens at Elgin referred to earlier. This receives support from its correlation with distance from head office: Elgin and Forres were two of the most distant depots in the survey.

It is also worthwhile to look at the effect of the background variables on the other accidents that are supposed to be beyond the drivers' control - those which take place in boarding/alighting and aboard a bus, and vandalism. There were significant relationships between the first two types of accident and both age and service, and with the latter category, with depot variables. In most situations vandalism followed the pattern of the other performance and accident variables; namely that the older and more experienced drivers reported fewer cases of it, and that it was more likely to occur in the larger depots. There was a particularly strong correlation between distance from head office and external vandalism: this may well be due to the effect of the two Central Scottish depots in this group (Hamilton, size = 177; Wishaw, size = 180) along with Paisley (size = 146), where the problem is worst. As these are all very near their respective head offices there may be more pressure on drivers to report vandalism.

6.4.2 WRT/intelligence scores and performance variables

The next table shows the correlations between the WRT and intelligence scores and the performance measures. The performance variables for which none of the WRT/intelligence items correlated significantly are excluded.

Variable	WRT	Risk	CFT	B
Discipline variables:				
Poor Timekeeping	-	-	11**	08**
Ticket issuing faults	10**	09**	-	-
Failure to stop	-	11**	-	-
Excessive absenteeism	-	-	06*	-
Excessive cash shortages	-	-	07*	-
Total offences	08*	-	12**	
Average lateness	16**	-	08*	-
Cash shortages (av weeks)	-16**	-	-14**	-15**
Verbal warning (discipline)	-	-	08*	-
Suspension (discipline)	-	-	07*	-
Accident categories:				
Collisions - vehicles	09**	07*	06*	-
Collisions - objects	12**	-	09**	09*
Total collisions	14**	09**	09**	08*
Accidents aboard bus	06*	-	09**	08*
Verbal warning (accidents)	13*	-	10*	08*
Suspension (accidents)	08*	-	-	07*

There were comparatively few significant correlations between the intelligence test items and the performance variables; the significant coefficients were fairly small in most cases. One general trend appears to be that higher intelligence was associated with a worse record, and more warnings and suspensions. Similarly, those who were quick-on-the-uptake (measured by words correct on the WRT) also seemed to have worse records, in particular average days late for work, collisions with objects and verbal warnings for accidents. Cash shortages is once again an exception to this rule: the more intelligent had fewer. This could be that they realise they will be financially penalised for any shortage, and take steps to ensure that they collect the correct fares, give the exact change, and count their takings precisely at the end of their shift. WRT Wrong, the variable postulated to measure risk, has only four, positive correlations.

6.4.3 Correlations between 16PF and performance measures

The full matrix for this is given in the appendix. Taking the "offence" variables first, almost a third of them correlated significantly with the test factors (excluding factor B, intelligence, which was discussed earlier) at a probability level of 5% of greater. In general, the correlation coefficients were fairly small, most being in the range .07 to .12. Some test factors had more significant correlations than others. These are summarised in the table below.

Factor/Description (low/high)		No.	Direction
A	Reserved/outgoing	3	2 +ve, 1 -ve
C	Emotional stability (less/more)	0	-
E	Humble/assertive	12	All +ve
F	Sober/enthusiastic	9	8 +ve, 1 -ve
G	Expedient/conscientious	9	1 +ve, 8 -ve
H	Shy/venturesome	12	All +ve
I	Tough/tender minded	3	2 +ve, 1 -ve
L	Trusting/suspicious	5	All +ve
M	Practical/imaginative	8	All +ve
N	Forthright/shrewd	8	All -ve
0	Self-assured/apprehensive	2	Both -ve
Q1	Conservative/experimenting	8	All +ve
Q2	Group-dependent/self-sufficient	6	All -ve
Q3	Lacks/is socially-precise	8	All -ve
Q4	Relaxed/tense	2	All +ve

94 correlations (31.33%) were significant at p = .05 or greater, from a total of 300 pairs.

No. = number of statistically significant correlations between each factor and the disciplinary variables.
+ve = number of these which were positive
-ve = number of these which were negative

Two factors had the highest number of significant correlations with the offence variables - E and H - both in the positive direction. A high score on factor E represents "assertive, self-assured and independent-minded" people who tend to be "disregarding of authority" (IPAT, 1986, p 25) and in this respect it is interesting that the highest correlation coefficient was with the rudeness variable (r=.14, p=.00). Also high were total disciplinary offences and those relating to absenteeism and lateness. Factor H, at the high level, describes people who are "sociable, bold, ... and abundant in emotional response ... However, they can be careless of detail, ignore danger signals and consume much time talking" (IPAT, 1986, p 27). This correlated positively with total offences (r=.12, p=.00), those relating to cash shortages and absenteeism, general carelessness (which includes cases of drivers being disciplined for setting the destination blind of a bus wrongly, for example, or for wearing uniform incorrectly) and all levels of disciplinary action from verbal warnings up to dismissal then reinstatement.

Two factors correlated with nine performance indicators: F, positively and G, negatively. High scores on F (representing happy-go-lucky, enthusiastic and carefree behaviour) were associated with poor performance, illustrated by correlations with absenteeism (r=.16, p=.00), lateness (r=.12, p=.00) and disciplinary actions for cash shortages (r=.11, p=.00), for example. G is negatively correlated with poor performance: a high score on this factor illustrates hard working, conscientious and responsible people with a sense of duty - it is not surprising that such people have fewer offences and disciplinary actions. G correlates r=-.14 with average number of days of unauthorised absence, for example, and correlates r=-.11 with both verbal warnings and cash shortages (all are significant at p=.00).

Most of the correlations were in the direction as might be expected, for example negatively between Factor N and the criteria: a low score on this suggesting forthright, natural and perhaps outspoken behaviour which, for example, correlated r=.11 with both total disciplinary offences and suspensions (each at p=.00). Positive correlations were found with factor Q1 (high score representing questioning attitude to life) and poor performance; negative correlations between factor Q3 (low score indicating lack of control and careless of social rules) and poor performance, the largest being r=-.12 (p=.00) with total offences. Of the factors which had few significant correlations, one stands out. This is the correlation between factor I and poor quality of driving of r=.14 (p=.00), a high score on I suggesting tender-minded, sensitive personalities being linked with reports for bad driving.

Looking at the matrix the other way round, as it were, some variables correlated with more factors than others. These included absenteeism and shortages, warnings and suspensions, and rudeness, general carelessness and miscellaneous offences. This suggests that personality determines these to some extent. Those correlating the fewest were failure to stop, quality of driving, complaints and timekeeping.

The next table shows the number and direction of correlations between the 16PF and the accident variables which were significant at p=.05 or greater. As can be seen there was a lower proportion of such correlations that were statistically significant than with the disciplinary variables.

Factor/Description (low/high)		No.	Description
A	Reserved/outgoing	0	-
C	Emotional stability (less/more)	0	-
E	Humble/assertive	2	Both +ve
F	Sober/enthusiastic	5	All +ve
G	Expedient/conscientious	4	All -ve
H	Shy/venturesome	5	All +ve
I	Tough/tender minded	2	Both -ve
L	Trusting/suspicious	3	All -ve
M	Practical/imaginative	7	6 +ve, 1 -ve
N	Forthright/shrewd	6	All -ve
0	Self-assured/apprehensive	5	All -ve
Q1	Conservative/experimenting	5	4 +ve, 1 -ve
Q2	Group-dependent/self-sufficient	3	1 +ve, 2 -ve
Q3	Lacks/is socially-precise	1	-ve
Q4	Relaxed/tense	0	-

48 correlations (17.78%) out of 270 pairs were statistically significant at p=.05 or greater.

No. = number of statistically significant correlations between each factor and the accident variables
+ve = number of these which were positive
-ve = number of these which were negative

As with the offence variables, the size of the correlation coefficients was fairly small, ranging from around r=.06 to r=.13. Factor M on the 16PF had the highest number of correlations, six being positive with accidents. A high score on this indicates someone who might be "unconcerned over everyday matters, ... often absorbed in thought, and oblivious of particular people and physical realities" (IPAT, 1986, p 28). Those at the opposite end tend to be "attentive to practical matters, concerned over detail, able to keep their heads in emergencies" (IPAT, 1986, p 28). It would appear that these are fairly good descriptors of those who have high and low numbers of accidents respectively. The highest correlations were r=.10 for total collisions and verbal warnings; the negative correlation was r=-.07 (p=.04) for dismissal then reinstatement for accidents.

Factor N had the highest correlation coefficients in this section, of r=-.13 with total collisions (p=.00) and r=-.11 with collisions with vehicles (p=.00). Four factors had five significant correlations with performance. Of these, factor F had a coefficient of r=.12 with total collisions (p=.00) and factor Q1 had one of r=.12 with collisions with animals (p=.00). The second of these was the more unusual and harder to explain. A high score on Q1 indicates a questioning, analytical and liberal personality, the opposite of the low scorer - conservative, respecting of established ideas and tolerant of traditional difficulties. It could be that those who have a low tolerance are more likely to run over animals than those with high tolerance. Factor O correlated r=-.07 with collisions with vehicles and r=-.08 with total collisions.

Some of the test factors which had a high number of correlations with discipline variables had only a few with the accident criteria. E, G and Q3 are examples of this. Factor E, which had the most correlations with discipline variables, had only two with accident ones, both of which were fairly small: r=.10 with total non-collisions (p=.009) and r=.07 with "not at fault" (p=.037). Q3 had only one correlation, of r=-.09 with "no action" (p=.016). Accident variables correlated negatively with factor G, the largest being r=-.11 with vandalism from outside (p=.003). This suggests that the more conscientious drivers take more care to ensure that their vehicles are not subject to attacks from outside, perhaps by not lingering in troublesome areas or by not inviting attack by disgruntled passengers.

The variables which had a high number of correlations with the test factors were mostly those which had fairly high frequencies - collisions with both vehicles and objects, and total collisions. A number had very few significant correlations: vandalism inside had none; collisions with pedestrians, boarding and alighting accidents, accidents aboard buses and verbal warnings had only one; and collisions with animals and vandalism outside had two each.

It is worthwhile at this stage to compare the correlations found in this research between 16PF variables and accident criteria with the published research studies in the same field discussed in the literature review. Amalgamating the results of such studies (Bracy, 1970; Freeman, 1952; Suhr, 1953, 1961) the following factors are suggested to correlate with high accidents: A+, C-, E+, F+, G-, M+, O+, Q1+, Q2-, Q3+, Q4+. In this research three factors did not correlate significantly with any of the accident variables - A, C and Q4. Q3 just had one relationship with the accident variables - negative with "no action". As discussed earlier, factor M had the greatest number of (positive) correlation coefficients with accident variables, which concurs with Cattell et al's remark that "automobile accidents are quite significantly lower for M- individuals" (Cattell, 1982, p 99). In addition, factors E, F, G and Q1 all correlated with accident data in the direction expected. The relationship was less clear with factor Q2: published studies suggest that those with a low score on this factor (ie, those who are more group-dependent) will have more accidents. With two variables this was the case (total non-collisions - r=-.11, p=.01 and boarding/alighting accidents - r=-.07, p=.05) but with another the opposite applied - written warnings for accidents (r=.08, p=.03). Finally, with factor O the research results in this study were the opposite to what might be expected, a high score (ie, more anxious) being associated with fewer accidents.

6.4.4 Correlations between commendations and performance

The one positive indicator of performance is the number of commendations a driver receives. This is probably far from perfect, as it may depend on depot policy whether such things are included in individual records, or it may depend on the extent of excursion and holiday tour work available in a depot, and who is allocated to it. The table below summarises the correlations between this variable and performance, both for the overall population and for Edinburgh only. The latter has such a high proportion of commendations issued to drivers in the sample that it merits separate treatment here.

	Category	
Variables	All cases	Edinburgh only
Age	12**	30**
Service	22**	41**
Depot size	21**	n/a
Distance HQ	-11**	n/a
Culture Fair total	-	-14*
Factor I	08*	15*
Factor N	08*	22**
Factor Q1	-08*	-18**
Ticket issue	07*	-16*
Failure to stop	-	-18**
Rudeness	07*	-
Excessive shortages	-07*	-
Cash shortages	-20**	-
Collisions - vehicles	-	-16*
Vandalism outside	-08*	-
No action	-	-14*
Dismissal/reinstatement	-	27**

It would appear that this variable captures a unique source of variance, as it has relatively few correlations with other variables. It was strongly correlated with age and service. In Edinburgh, in particular, most of the commendations came from passengers who have been on tours. The drivers operating these tend to be the older and longer-serving, this being a privilege which comes with seniority. Three 16PF factors correlated with commendations - high scores on I (tender-minded) and N (shrewd, wordly) as well as low scores on Q1 (conservative, traditional, tolerant) all correlated with high numbers of commendations. In this research, all three of these factors also correlated significantly with age - I and N positively and Q1 negatively. One unexpected relationship was with dismissal then reinstatement for accidents, at Edinburgh. On the basis of the few significant correlations with performance, it might be expected that "good" performance leads to commendations and that "bad" performance would lead to few, if any. It would be highly unlikely that dismissal for an accident would fall into the former category. Given the small number and uneven distribution of commendations, however, it is perhaps best not to draw too many conclusions from the above.

6.4.5 Summary

From the evidence from correlation matrices presented so far, the following direction of values of background and scores on the tests might seem to determine good and bad performance. "Good" and "bad" performance are, of course, subject to the qualifiers discussed in the research methodology chapter.

Factor/Description (low/high)	Performance "Good"	"Bad"	Based on
Biographical:			
Age	Older	Younger	Dis, acc
Joining age	Older	Younger	Dis
Service	Longer	Shorter	Dis, acc
Car licence (prior to joining)	Longer	Shorter	Dis
Previous jobs	Fewer	More	Dis*
Situational:			
Depot size	Smaller	Larger	Dis, some acc
Distance from head office	Further	Nearer	Dis, some acc
Word recognition/culture fair tests:			
WRT right (quick on uptake)	Low	High**	Dis, acc
WRT wrong (risk)	Low	High**	Dis
Culture Fair total (intelligence)	Low	High**	Acc
16PF variables:			
A Reserved/outgoing	No evidence		
B Intelligence	Low	High*	Acc
C Emotional stability (less/more)	No evidence		
E Humble/assertive	Low	High	Dis
F Sober/enthusiastic	Low	High	Dis, acc
G Expedient/conscientious	High	Low	Dis
H Shy/venturesome	Low	High	Dis
I Tough/tender minded	No evidence		
L Trusting/suspicious	Low	High	Dis
M Practical/imaginative	Low	High	Dis, acc
N Forthright/shrewd	High	Low	Dis, acc
O Self-assured/apprehensive	High	Low	Acc (weak)
Q1 Conservative/experimenting	Low	High	Dis, acc
Q2 Group-dependent/self-sufficient	High	Low	Dis
Q3 Lacks/is socially-precise	High	Low	Dis
Q4 Relaxed/tense	No evidence		

References:

* = reverse for the only accident variable
** = reverse is true for cash shortages
Dis = discipline (and attendance/cash shortage) records
Acc = accident records
No evidence = insufficient significant correlations to form conclusion

CHAPTER SEVEN

FACTOR ANALYSIS OF PREDICTOR AND CRITERION VARIABLES

7.1 Introduction

This chapter presents the results of the third level of analysis, the multivariate analysis of the variables. A description of factor analysis was given in the fourth chapter. In effect, this reduces the large number of original variables to a smaller number in order to see the underlying relationships, and hopefully provide some explanation for them.

Both the tests of significance and the correlations described in the previous chapters suggested that age and size of depot have an effect on performance: on average, the older drivers tend to have better performance (or more accurately, have fewer offences and accidents) than do drivers in smaller depots. In order to investigate these relationships further the data is not only analysed as a whole, for all drivers, but is also divided into groups by age and by size of depot.

Separate analyses were carried out for drivers above/below the age of 40, and for drivers in depots greater than and smaller than 100 drivers. 40 was chosen as the dividing point for age as it was the mean (the median was 39 and the mode 38). This split the data into two groups of approximately equal size. In addition, most of those recruited are under the age of 40. As one purpose of this research was to provide data on which to revise recruitment procedures, this gives an extra justification for splitting the drivers into two groups.

Depots of around 100 drivers and over in the Scottish Bus Group have both an area manager (in charge overall, with responsibility for both running services and maintenance of vehicles) and a traffic supervisor (his deputy, in charge of the drivers), above the ranks of inspectors and drivers. Those of under 100 drivers tend to have just an area manager and inspectors, with no intermediate grade. In addition they also, by reason of their size, tend to be located in more rural areas and operate fewer exclusively town services. The opposite is the case for the larger depots: the four in this survey are all located in large urban areas, with a high proportion of driving within these areas. The "large depot" category contains around 420 cases, the "small depot" category around 140.

Factor analysis was carried out on all cases for which complete data (ie. both test and performance) were available. As described in the methodology chapter, the analysis was performed by SPSS-X using the "Factor" procedure, with the following options: "meansub" (replacement of missing values with the variable mean); "alpha" factor extraction; and "oblimin" (oblique) rotation. As with the previous chapters, the resultant computer printouts have been placed in the appendix (Appendix D) with summary tables of the factors from the "structure matrix" appearing as appropriate in the main body of the text. The factor loadings are treated in the same way as the correlation coefficients were previously: it is assumed that they are in the range of -0.99 to +0.99 and are presented to two decimal places with nonsignificant zeros and decimal points being ommitted, to ease the reading of tables. In the few cases where the loadings exceed +/-0.99, the full notation is used.

As this research was concerned to discover the relationships between the "inputs" a driver brings to the work situation (measured here principally by the psychological test scores) and the "outputs" he makes (the offence and accident variables) the two sets of data are factor-analysed separately, with the final stage being the intercorrelation of the two groups of factors. This chapter, therefore, first discusses the factoring of the test scores, compares these second-order factors with published data in this field, and then examines the correlation of these factors with performance variables. The performance variables are then subjected to factor analysis. The final section examines the correlations between the two sets of factors.

7.2 Factor analysis of predictor variables

7.2.1 Introduction

The predictor variables comprised the test scores from the WRT, Culture Fair (total score) and the 16PF, along with age as it has a strong influence on test performance. As there was a high degree of intercorrelation amongst the other biographical items (such as joining age and service) these were omitted. Also omitted were those which were not at either the interval or ratio level of measurement (most of those relating to previous employment and education) which is required for factor analysis, following the recommendations of Kim and Mueller (1978b).

In essence, the factor analyses of these test variables produced second-order factors. The 16PF gives scores for primary (or first order) factors, as it itself is derived from factor analysis; the analyses following involved taking these first-order factors and conducting a further factor analysis, thus producing second-order factors.

7.2.2 All drivers

The table below details the six factors derived from an analysis of all cases (taken from the structure matrix on the output), along with the percentage of variance accounted for by each factor, the variables loading on each and the size of their loading. The labels are based on the internal correlations in each factor.

Factor	% of Variance	Variables	Loading	Label
1	10.7	E	60	Tolerance
		Q1	47	(low)
		N	-39	
		I	-36	
		[F	40]	
		[H	36]	
2	13.7	Q4	-79	Anxiety
		C	76	(low)
		O	-74	
		L	-43	
		[Q3	40]	
		[H	38]	
3	8.3	H	69	Extroversion
		F	68	(high)
		Q2	-65	
		A	52	
4	3.7	M	-35	Imaginative/
		Risk	-26	risk (low)
		[N	34]	
		[Age	-28]	
5	3.4	G	63	Age/
		Q3	59	conscientious
		Age	47	(high)
6	3.0	CFT	80	Intelligence
		WRT	70	(high)
		B	44	

Total amount of variance accounted for was 42.9%.

The variables shown under each factor were those derived and sorted by the program. On occasions some of the other variables also had high loadings for particular factors, and these are shown in brackets under each factor. Six, clearly identifiable factors emerged therefore. Two of these were immediately recognisable as established second-order factors in the 16PF - anxiety and extroversion - with intelligence being composed of CFT and WRT as well as factor B, and conscientiousness having age as part of it as well as G and Q3. The first factor - labelled here as tolerance - was not one of the established factors from the test. At the "high" end it might describe someone who is fairly humble, conservative, quiet and not argumentative. The opposite might be a person who is assertive, forthright, questioning and less likely to accept the status quo. A full discussion and comparison of these factors with the established second order ones is be made in section 7.3 below.

The output also gives a factor correlation matrix, which is shown below:

	1	2	3	4	5	6
1	-					
2	-06	-				
3	14	13	-			
4	-08	03	03	-		
5	-19	08	07	12	-	
6	21	18	-05	02	-19	-

1. Tolerance (low)
2. Anxiety (low)
3. Extroversion (high)
4. Risk (low)
5. Conscientiousness (high)
6. Intelligence (high)

Among the larger correlation coefficients were those between 1 and 5 (suggesting that the older subjects with higher standards tended to be more tolerant) and between 1 and 6 (implying that the more intelligent were less tolerant and more likely to argue with their superiors or passengers, perhaps because their intelligence made them know they were right). Lower anxiety was associated with higher intelligence and with a more extrovert personality. As might be expected from the previous chapter, the age and intelligence factors were strongly related: higher age bringing lower intelligence.

7.2.3 Cases split by age

The following factors emerged when the data was split by age:

(a) Aged 40 and below

Factor	Variance	Variables	Loading	Label
1	10.8%	E	72	Tolerance (low)
		Q1	48	
		L	47	
		N	-45	
		[H	43]	
		[F	39]	
2	13.3%	Q4	-82	Anxiety (low)
		C	78	
		O	-68	
		Q3	49	
		[L	-42]	
3	8.4%	WRT	80	Intelligence (high)
		CFT	67	
		B	44	
4	3.9%	M	-55	Sensitive/ risk (low)
		I	-49	
		Risk	-21	
		[G	28]	
5	4.5%	H	70	Extroversion (high)
		F	64	
		Q2	-62	
		A	61	
6	2.7%	Age	55	Age/ conscientious (high)
		G	48	
		[N	35]	
		[F	-33]	

Total amount of variance accounted for was 43.7%.

Correlation matrix between the factors:

	1	2	3	4	5	6
1	-					
2	-12	-				
3	13	04	-			
4	01	06	-11	-		
5	12	16	-05	08	-	
6	-24	01	-14	15	-04	-

1. Tolerance (low)
2. Anxiety (low)
3. Intelligence (high)
4. Sensitive/risk (low)
5. Extroversion (high)
6. Age/conscientiousness (high)

(b) <u>Aged above 40</u>

Factor	Variance	Variables	Loading	Label
1	14.7%	Q4	-80	Anxiety
		O	-77	(low)
		C	74	
		L	-46	
		[H	37]	
		[Q3	45]	
2	8.4%	CFT	69	Intelligence
		B	54	(high)
		WRT	52	
3	8.5%	F	71	Extroversion
		H	67	(high)
		Q2	-62	
		A	46	
		[E	35]	
4	5.2%	Q3	76	Conscientious
		G	51	(high)
		M	-29	
		[C	30]	
		[H	25]	
5	3.3%	Age	70	Age/risk
		Risk	23	(high)
		[CFT	-43]	
6	2.5%	I	-51	Toughness
		[CFT	31]	(high)
		[B	31]	
7	2.1%	N	61	Tolerance
		E	-50	(high)
		Q1	-36	
		[H	-38]	
		[L	-34]	

Total amount of variance accounted for was 44.6%

The following is the correlation matrix between the factors:

	1	2	3	4	5	6	7
1	-						
2	16	-					
3	12	-08	-				
4	14	07	23	-			
5	02	-15	-08	-05	-		
6	02	13	-01	-13	-17	-	
7	11	-05	-10	12	-03	-30	-

1. Anxiety (low)
2. Intelligence (high)
3. Extroversion (high)
4. Conscientiousness (high)
5. Age/risk (high)
6. Toughness (high)
7. Tolerance (high)

A pattern of factors similar to those for all cases emerged when the data was split by age. Anxiety and intelligence each accounted for approximately the same amount of variance in each group, with the tolerance factor being of greater importance in the younger group and extroversion being likewise in the older group. The composition of some of the factors differed as well. In both the overall and younger groups age was linked with G, suggesting that the older drivers had higher standards. However, with the over-40 group, age and the number of words wrong on the WRT came together to form a factor. There was a very small correlation coefficient between age and conscientiousness.

The correlations between factors were similar to those found for the overall situation, as well. In the younger group age/conscientiousness was associated with both high tolerance and low intelligence. Low anxiety and high extroversion were also related. In the older group, high tolerance was strongly related to low toughness (ie, tender-mindedness) (both these factors accounted for very small proportions of the variance, however). Intelligence and age/risk were negatively related, not only implying that the older one becomes, the lower one's score on the intelligence tests, but that the older drivers scored more words incorrectly on the WRT. This was suggested in the correlation chapter. Somewhat surprisingly, conscientiousness (with no age in this situation) was fairly strongly associated with both low anxiety and high extroversion.

7.2.4 Cases split by size of depot

The third way in which the predictor variables were factor-analysed was by dividing them into two groups on the basis of size of depot. Similar factors to the ones above were derived from the analysis; these are shown in the table below.

(a) Small depots

Factor	Variance	Variables	Loading	Label
1	15.5%	Q4	-84	Anxiety
		C	76	(low)
		O	-64	
		L	-59	
		Q3	49	
		[H	41]	
2	9.3%	CFT	79	Intelligence
		WRT	71	(high)
		Age	-54	
		B	44	
3	8.7%	H	74	Extroversion
		F	69	(high)
		Q2	-64	
		A	41	
		[E	43]	
4	4.2%	E	54	Tolerance
		Q1	54	(low)
		N	-46	
5	4.0%	G	58	Conscientious
		I	27	(high)
		[Q3	53]	
		[A	31]	
		[Age	30]	
		[H	29]	
		[Q4	-28]	
		[Q1	-27]	
6	3.0%	Risk	76	Risk (high)
7	2.7%	M	-59	Thoughtful
		[B	-34]	(low)
		[CFT	-33]	
		[O	-29]	

Total amount of variance accounted for was 47.5% (the highest of all five analyses). The intercorrelation matrix is given below:

	1	2	3	4	5	6	7
1	-						
2	11	-					
3	12	13	-				
4	-11	18	11	-			
5	18	-11	12	-10	-		
6	-15	-21	02	00	06	-	
7	-21	-23	14	-02	02	13	-

1. Anxiety (low)
2. Intelligence (high)
3. Extroversion (high)
4. Tolerance (low)
5. Conscientiousness (high)
6. Risk (high)
7. Thoughtfulness (low)

(b) Large depots

Factor	Variance	Variables	Loading	Label
1	11.4%	E	60	Tolerance (low)
		L	45	
		Q1	45	
		I	-41	
		N	36	
		[F	45]	
		[H	38]	
2	13.3%	H	71	Extroversion (high)
		F	71	
		Q2	-62	
		A	52	
		[E	30]	
3	8.3%	CFT	77	Intelligence (high)
		WRT	69	
		B	43	
		Age	-43	
4	3.9%	Q3	61	Conscientious (high)
		G	61	
		M	-42	
		[Age	38]	
		[N	31]	
5	4.0%	Risk	30	Risk (high)
		[Age	43]	
		[N	-30]	
		[M	27]	
6	2.9%	Q4	81	Anxiety (high)
		C	-76	
		O	74	
		[Q3	-42]	
		[H	-39]	
		[L	39]	

Total variance accounted for was 43.9%

The intercorrelation matrix is given below:

	1	2	3	4	5	6
1	-					
2	16	-				
3	20	-07	-			
4	-16	02	-16	-		
5	07	-05	-03	-11	-	
6	07	-16	-08	-10	03	-

1. Tolerance (low)
2. Extroversion (high)
3. Intelligence (high)
4. Conscientiousness (high)
5. Risk (high)
6. Anxiety (high)

Extroversion and intelligence accounted for large proportions of the variance in both cases; anxiety accounted for the largest proportion in the small depots but the smallest in the large ones. Similarly, tolerance was the first factor to emerge for the large depots, but only the fourth (with a small proportion of variance) in the small ones. In both cases age was included in the intelligence factor, negatively related to high scores on the tests. The pattern of factors in the large depots was very similar to the overall pattern, not surprisingly as they accounted for around three-quarters of all cases. In the smaller depots, tolerance just comprised three factors, risk formed a factor on its own as did M, with loadings on intelligence.

Studying the intercorrelation matrices between these factors, in the small depots two of the factors which comprised very few primary factors had some high correlation coefficients with other factors. Factor 7 ("thoughtfulness"), for example, was associated with low anxiety, high intelligence and extroversion. Factor 6 ("risk") was strongly correlated with both high anxiety and low intelligence. High conscientiousness and low anxiety went together as did high intelligence and low tolerance. The patterns in the large depots were more or less as expected - high tolerance being associated with conscientiousness, low intelligence and introversion. Extroversion and anxiety were negatively related.

7.2.5 Summary

A number of factors consistently emerged from the analyses presented above. These included some which were recognisable from published material on second-order factors in the 16PF (anxiety, introversion/extroversion, intelligence and conscientiousness) (eg, Cattell et al, 1982) and others which were less-so, in particular "tolerance" and those involving the variable "WRTwrong".

At this stage a few comments can be made concerning some of the principal correlations between the second-order factors. The tolerant drivers would appear to be the older ones who have low anxiety, high standards, lower intelligence and are more introvert. Correlations coefficients between this factor and that involving risk were almost neglible. In two of the situations above, however, high tolerance was associated with high risk: overall, where risk was joined by M and with older drivers, where it was joined by age. In both cases, however, this relationship may have more to do with the other variables loading with risk than with risk itself, as they were both associated with high tolerance. In addition, the coefficients were very small.

The more intelligent drivers, by contrast, tended to be younger, less conscientious and have lower tolerance. However, they also had lower anxiety and (except with the smaller depots) were more introvert. Unlike the other groups, those under 40 had higher risk. Conscientiousness was mainly associated with high tolerance and low intelligence, the latter being principally a function of the effect of age. It was also related to low risk (except in the small depots) and low anxiety. In general, conscientiousness went with introversion, however, the reverse was the case for small depots and those over 40. Extroversion was associated with low anxiety.

The correlations involving "risk" (other than those discussed already) tend to be very small: in most cases it is related to introversion, high anxiety and younger people. The highest correlation involving anxiety is in the small depots (r=-.15) and the highest one with age in the younger age group (r=.15). The latter suggests that, within this group, those at the upper end of the age scale are less likely to have a high risk score than those at the lower end.

7.3 Interpretation of the second order factors

This section examines in more detail the factors derived from the analysis and described above, comparing them with published data on second-order 16PF factors, both from the official handbooks and research papers. The "official handbooks" are those published by the publishers of the test - the Institute for Personality and Ability Testing (Champaign, Illinois). In this particular research, however, the sixteen scores from the personality test have been joined by age along with scores from the Culture Fair test (total only) and the WRT.

7.3.1 Comparison with IPAT second-order factors

Cattell *et al*, in their *Handbook to the 16PF* (1982), refer to eight second-order factors for the test, although advise that at least two have not been well-defined and have weak criterion associations, and include intelligence, which is based only on primary factor B. The more recent IPAT publication, *Administrator's Manual for the 16PF* (Krug and Johns, 1986), contains just five second-order factors, with slightly different and more precise formulae for their calculation. These were based on a large-scale cross-validation of the test and do not include intelligence.

A number of the second-order factors from the bus driver research bear fairly close relation to their "official" counterparts, as described in the IPAT publications referred to in the previous paragraph. These were anxiety, extroversion, intelligence and conscientiousness (this author's label for "super-ego strength/control").

Anxiety was a factor which consistently accounted for a large proportion of the variance in each analysis. Those with a low score for this are described as those who are generally satisfied in life, are able to achieve what they want to, but who may, if they have a very low score, lack motivation for difficult tasks. High anxiety can be understood for its everyday meaning - people who are frustrated with not being able to meet the demands of life and achieve what they desire. The factor is defined as follows:

Factor	Direction	Description
C	Low	Affected by feelings
H	Low	Shy, restrained, threat-sensitive
L	High	Suspicious, hard to fool
O	High	Apprehensive, worrying
Q3	Low	Undisciplined self-conflict
Q4	High	Tense, frustrated, overwrought

In some of the research results the anxiety factor comprised exactly these factors; in others, 'H' did not appear and in one case, the factor just comprised low C, high O and high Q4 ("large depots").

The extroversion factor was the other which followed almost exactly the ideal pattern. This again frequently accounted for a high proportion of the variance. A high score on this factor indicates one who is socially outgoing, uninhibited and good at making and keeping personal contacts. A low score describes a shy, inhibited person who finds it hard to make contact on a personal level. The latter tended to make for the better driver, in terms of the criteria used by the bus companies. Extroversion is defined in terms of four 16PF factors:

Factor	Direction	Description
A	High	Outgoing, warm-hearted, participating
F	High	Enthusiastic, lively
H	High	Venturesome, socially bold, uninhibited
Q2	Low	Group dependent - joiner and follower.

The 1982 Handbook included 'E' in this factor (assertive, aggressive, competitive); more recent studies have dropped it (Karson and O'Dell, 1976; IPAT, 1986). In the driver research, the four factors above describe extroversion on all but two occasions, where factor E is included ("all cases greater than 40"; small depots).

Intelligence was the third factor to appear consistently in the research. As mentioned earlier, Cattell et al (1982) find that it is related only to factor B on the test. A high score on this factor describes one who is intelligent, quick to grasp ideas and bright. A low score describes the opposite - one who is slow to learn and grasp ideas, and who is given to concrete and literal interpretation. It is perhaps not surprising that this factor becomes a second-order factor on its own, as

Cattell et al say,

> the principal object in measuring it in the 16PF is not to add personality information as such, but to complete the supply of data on the range of source traits important in most predictions, for general ability is obviously an important dimension in individual differences (p.82)

Furthermore they recommend supplementing 'B' with the IPAT Culture Fair test in order to get a more accurate measure of intelligence. This is in fact what did happen, with the Word Recognition Test being added as well.

The strong correlations between the culture fair scores, B and WRT Right are reinforced by their appearance in the intelligence factor. As age also correlated highly with this, it is perhaps surprising that age was loaded with intelligence only when the data was split by size of depot, although there were often high correlations between the factors containing intelligence and age in practice. In each case, the three intelligence variables (Culture Fair Total, total correct on the Word Recognition Test and factor B on the 16PF) formed a distinct second-order factor with no other variables having high loadings.

The fourth factor to bear a fairly strong resemblance to published factors is what is referred to here as "age/conscientiousness" and in the literature as "superego strength/control". Those who score highly on this tend to be self-controlled and to abide by the rules of the situation they are in; at the extreme are those who are so controlled as to be perceived by others as too rigid or moralistic. At the opposite end of the scale are those who are flexible and follow their own impulses, rather than conventionally perceived values or standards, and bend rules when it suits them. Krug and Johns (1986) define the factor as having just two primary factors:

Factor	Direction	Description
G	High	Conservative, moralistic
Q3	High	Controlled, socially-precise

In the 1982 Handbook these were joined by low F (sober, prudent, serious). In the driver research, these were joined by a variety of different factors. Age came into these factors in all but one case. In "all cases" the factor just comprised the two variables above with age; with "drivers under 40" G and age were joined by N (shrewd, calculating, worldly), with Q3 not loaded to any great extent. In the former (all cases) it appeared that the older subjects had higher standards; in the latter situation, the drivers at the upper end of the younger age group were more likely to have higher standards but perhaps also have the ability to sense when they should put them into operation and when not to. By contrast, the standards factor in the case of older drivers and those in larger depots comprised the two original factors above along with low M (practical, careful, conventional). This suggests that perhaps those with high standards have a desire to do things the correct way and pay attention to detail, albeit in rather an unimaginative way.

The standards factor in the small depots was different once again: G, Q3 and age were joined by I (tender-minded, sensitive) along with high loadings on A (outgoing), H (venturesome), low Q1 (conservative) and low Q4 (relaxed). It is hard to draw conclusions from this other than to suggest that those with high standards are also fairly sensitive whilst at the same time appearing relaxed and outgoing.

There is one second-order factor which consistently appears in the driver analysis and often accounts for a fairly large proportion of the variance. It is labelled in this research as "tolerance" but does not appear in either of the IPAT manuals for the test. It was composed of the following:

Factor	Direction	Description
E	Low	Humble, mild, conforming
N	High	Shrewd, socially aware, experienced
Q1	Low	Conservative, respects established ideas
H	Low	Shy, restrained, timid
L	Low	Trusting, adaptable
F	Low	Sober, prudent, serious

The first three factors were present in each analysis; H in all but one ("small depots"), L in all but two ("small depots", "all cases") and F in all but two ("over 40" and "small depots"). People who score high on this could perhaps be described as showing tolerance to all around them - passengers, other road users and superiors; by accepting situations and orders without question and generally getting on with their job without making trouble. Those who score low on this factor are more likely to be of an argumentative and rude disposition, not being tolerant of those around them, continually questioning orders and situations, and perhaps incurring more the displeasure of their supervisors.

The correlation between factors discussed earlier showed that high tolerance was related to age/standards: the older drivers being more tolerant, perhaps due partly to their inbuilt high standards and partly to experience telling them that not arguing and questioning makes life easier for them. High tolerance was often found to be negatively related to intelligence - the more intelligent drivers seeing faults in work systems and orders, and perhaps being less tolerant of passengers who might not really know where they are going or of other road users who make driving errors. This suggests that their intelligence would enable them to find faults in systems and people, and their personality would cause them to draw attention to them.

This tolerance factor bears some resemblance to Krug and Johns' interpretation of the independence second-order factor (male formula), which is composed of the following:-

Factor	Direction	Description
*E	High	Assertive, aggressive, stubborn
G	Low	Expedient, disregards rules
*H	High	Venturesome, socially bold, uninhibited
*L	High	Suspicious, self-opinionated
*N	Low	Forthright, natural, unpretentious
O	Low	Self-assured, confident
*Q1	High	Experimenting, literal, analytical
Q2	High	Self-sufficient, prefers own decisions.

(* = factors in common with tolerance)

A person high on tolerance could, therefore, be low on independence. The latter state is referred to as subduedness and described as being group-dependent, chastened, passive and seeking and needing support from other people. Tolerance was similar to this but without both the group-dependency (Q2) and high anxiety (O); high standards being implied if not actually being present. Those high on independence tend to be aggressive, independent and daring, seeking situations where this sort of behaviour is tolerated or even rewarded, and where they can show initiative.

The final second-order factor to emerge from the analysis was the one which contained the "WRT Wrong" variable. It is harder to draw from conclusions about this, as different analyses produced different combinations of primary factors, and the variance accounted for in each case was small. With the exception of the case for small depots, where "WRTwrong" formed a separate factor, one or two summaries can be made:-

1. Cases : all under 40

Factor	Direction	Description
Risk	High	Risk-taker
G	Low	Expedient, disregards rules
I	High	Tender-minded, sensitive
M	High	Imaginative, careless of practical matters

2. Cases : all cases
large depots

Factor	Direction	Description
Risk	High	Risk-taker
M	High	Imaginative, careless of practical matters
N	Low	Forthright, unpretentious
Age	High	Older subjects

3. Cases : all over 40

Factor	Direction	Description
Risk	High	Risk-taker
Age	High	Older
CFT	Low	Less intelligent

Any interpretation drawn from these factors is tentative to the extent that "WRT Wrong" is hypothesised to be a measure of risk-taking (Ingleton, 1987): there is a lack of concrete research data at present to prove as conclusively as is possible in social science that it is. Bearing this in mind, the first case referred to above links risk-taking with expediency, sensitivity and imagination: factors G and M, in particular, are associated with the way the Word Recognition Test is completed: those who have a high number of words wrong are those who tend to disregard rules (they are told clearly not to guess) and are imaginative (they "fit" other words to ones they do not know). Interestingly (in the case of all subjects under 40) it was also linked to the quickness-on-the-uptake score, with number of words wrong perhaps being related to the total number identified.

This situation is close to two of Cattell et al's original eight second-order factors. One of these is QIII "tough poise", comprising (for males) low A, low I and low M. At the high end this is described as being cheerful, alert and ready to tackle problems at an objective level, to deal with facts at the expense of people. At the low end this is associated with sensitivity to the needs of others and thinking about a problem before taking action. "Tough poise" in the most recent IPAT manual (Krug and Johns, 1986) contains (for males) two additional first order factors, F+ and Q1-, neither of which load on to the risk factor in the driver research. This much reduces the resemblance of tough poise to risk and is the reason why the earlier formula (Cattell et al, 1982) is used instead. The other second-order factor is one which they do not discuss at length for lack of criterion validation. This is QVI: "cool realism versus prodigal subjectivity", comprising primary factors I(high), M (high) and L (low). The last is described as "suspicious, hard to fool, self-opinionated" and is replaced in the drivers' case by G (low).

The second case above associated risk-taking with imagination (as before) but also with forthrightness.

Those who have the latter characteristic will perhaps not worry about putting down wrong answers (or those where they have used their imagination). In the overall sample, this tendency increased with age. The dominant factor in the final situation is probably age, with no 16PF factors appearing at all. It merely suggests that, in the older half of the sample, the older a driver was, the more likely he was to have a higher number of words wrong in the WRT and a lower level of intelligence.

7.3.2 Interpretation: evidence from research studies.

Turning now to the wider body of research using the 16PF, a number of studies have produced data on second-order factors derived from the test. Eighteen of these have been examined, ranging from Cattell (1956) - one of the first to discuss second-order factors on the test - to one of the most recent, Reuter et al (1985). The factors which these studies discovered will be compared with those derived in the present research.

Extroversion and anxiety are replicated more or less exactly in most of the studies. Taking the first of these, some included low M (practicality) and low Q1 (traditional), neither of which were found in this research. Some of the earlier studies, such as Horn (1963), Tsujioka and Cattell (1965) and Gorsuch and Cattell (1967) found high E (assertiveness) as well, which was found to be associated with extroversion in older drivers and those in small depots. Later studies have not found E to be included in this dimension.

Some of the analyses of driver data included factor H in the anxiety factor (as in the IPAT descriptions), others did not. The same is true for published research. Those that do include Gorsuch and Cattell (1967), Cattell and Nichols (1972) and Bolton (1977); those that do not include Krug and Laughlin (1977), Cattell (1956) and Winder et al (1975). No other variables were found to load on this factor.

More interesting differences are found with the other factors, for example that referred to as "superego strength" in the IPAT manuals and as "age/conscientiousness" here. In this research this factor was less consistent across different analyses, and age was included in some of them. Some of the earlier published studies, in particular, did not derive this factor at all, eg. Cattell (1956), Tsujioka and Cattell (1965) and Hundleby and Connor (1968). In others, it followed closely the formula of the later IPAT manual (1986), of being composed of just factors G and Q3 (for example Krug and Laughlin, 1977); Gillis and Lee, 1981). Age/standards for the older drivers comprises, in addition, factor M in the opposite pole to G and Q3. As discussed earlier, this implies that high standards are associated with a practical and conventional approach to life. This combination has not been found in any of the published studies.

It was mentioned earlier that the "tolerance" factor from the driver research bore some resemblance to Krug and Johns (1986) independence second order factor, in the IPAT manual. Their factor comprised eight primaries from the 16PF of which five were in common with tolerance. Some of the published research studies come closer than this. Winder et al (1975) is an example of this: their study was principally concerned with experimental motivational distortion and faking scales for form A (form C already has a scale built-in to measure this). At the same time, they conducted a second-order analysis which came fairly close to the usual factors. One of these was independence, composed of E+, L+, N- and Q1+. The only comment which they make is that the inclusion of N- is atypical; in this case, however, it is almost an exact "replica" of the factor derived for the younger drivers (those aged 40 and under). A similar pattern is found in a cross-cultural study between Japanese and American subjects carried out by Tsujioka and Cattell (1965). The indepedence-vs.-subduedness factor for one of the USA groups comprises E+, F+, G-, N+ and Q1+. This is an interesting variation, in that G- is included (expediency) with high independence, and that factor N is in the same direction as E, F and Q1. In addition, their "insecure assertiveness" factor for samples from both countries comprised L+, N+ and Q1+: these are three of the components of tolerance for the younger drivers, with only factor E missing.

In the IPAT manual (1986), Winder et al's research (outlined above) and the bus driver study, N was in the opposite direction to the other three. In these cases, high tolerance or subduedness includes high N (shrewdness); in the case above it would be associated with low N (forthright and unpretentious). A similar situation is found in an earlier study by Cattell (1956), where E+, G-, N+ and Q1+ form a factor he calls "unbroken success vs. frustration". At the low end this would signify a conservative, conventional and fairly conforming personality, not particularly sophisticated but being fairly forthright. Another variation to this was derived by LaForge (1962), whose "unbroken success" factor comprises just E+, N+ and Q1+.

Another factor which was harder to relate to the "official" second-order factors was that which included "WRT Wrong". Above it was found that two of the original second-order factors - tough poise and realism - had elements of the factor involving risk-taking. The picture is little clearer when other research studies are examined. Few in fact refer specifically to the realism factor (although some incorporate elements of it). Of those that derived "tough poise" (or "cortertia vs. pathemia" as a number call it) most include factor A(+) along with I+ and M+ (eg. Gorsuch and Cattell, 1967;

Winder et al, 1975; Bolton, 1977) and some include Q3(-) (eg. Gillis and Lee, 1978). Horn (1963) has a factor which has A+, G-, I+, M+ and N-: he finds this unusual in that it did not clearly replicate previous findings and he felt it reflected "individual differences in a sensitive causalness such as is sometimes said to characterise the artist or actor" (p.130).

There are one or two exceptions, for example Krug and Laughlin (1977): their tough-poise factor contains just I- and M- (for males; with females it includes Q3-). The same was found by LaForge (1962) who labelled it "sensitivity", and Golden (1978); with Allen and Schuerer (1983) Q2 loads in the same direction as I and M, and for Reuter et al (1985) these two are joined by B, again in the same direction. All these are fairly close to the situation for the younger group of drivers, where the factor was composed of these two primaries along with WRT Wrong (low) and a smaller loading on G+. Another is Becker (1961): his "masculinity-femininity" factor has just M+ and N-, which are the two original variables in the risk factor (along with WRT Wrong) for all cases.

7.3.3 Comparison of correlations between factors

Section 7.2.5 above discussed the main correlations amongst the second order factors derived from test scores. This section now compares some of these correlations with those studies which have published data on such correlations. Only three of the above studies refer to these: the test Handbook (Cattell, et al, 1982), and the papers by Gorsuch and Cattell (1967) and Krug and Laughlin (1977). The correlations mentioned in this section just include those from the driver research which are easily recognisable; they do not include tolerance or those involving risk, for example, as these are not easily comparable with the published studies. None of the correlations which Gorsuch and Cattell report between the variables used here are of any consequence, and so receive no further mention here.

The correlations discussed here can be divided into two groups - those involving anxiety and those involving conscientiousness. To take the first of these, (low) anxiety correlated with three other factors: (high) intelligence, extroversion and conscientiousness. With both intelligence and extroversion, both Krug and Laughlin and the test Handbook report high correlations with anxiety, in the direction expected. Only the handbook reports a strong correlation with conscientiousness; in the two articles it is almost neglible. Conscientiousness was also found to be associated with two other variables - high extroversion and low intelligence. Taking the first of these, extroversion and conscientiousness were positively related in all cases except the younger age group); only in Krug and Laughlin's research was this found, and only for their male sample; in the Handbook it was negative. The other correlation discussed here (between high conscientiousness and low intelligence) was borne out by both the Handbook and Krug and Laughlin.

7.4 Correlations between test factors and criteria

The next stage was to correlate the factors derived above with measures of job "performance". Following the factor analysis detailed in the previous section, the factor scores were calculated for each driver, and these were then correlated (using Pearson product-moment correlation) with the actual offence and accident variables detailed previously. These, therefore, are "external" correlations between the factors as a whole and outside variables. SPSS-X produced tables in a rectangular format which are included in the appendix. The following summarise these by showing those correlations where the statistical significance was p=.05 or greater.

7.4.1. All cases

Factor 1: "Tolerance" (low)

Poor Timekeeping	11
Rudeness	11
General carelessness	09
Excessive absence	14
Excessive shortages	12
Complaints	09
Commendations	-08
Average lateness	12
Average absence	15
Cash shortages	09
Total offences	16
Verbal warnings	15
Collisions - animals	07
Collisions - objects	12
Miscellaneous accs.	-08
Total collisions	11
Total non-collisions	09

Factor 2: Anxiety (low)

Collisions - vehicles	09
Accidents aboard bus	08

Factor 3: Extroversion (high)

General carelessness	10
Excessive shortages	13
Miscellaneous offences	09
Average lateness	11
Average absence	10
Total offences	12
Total collisions	09
Total non-collisions	07

Factor 4: Imagination/risk (low)

General carelessness	-09
Driving faults	-09
Commendations	11

Factor 5: Age/conscientiousness (older/higher)

Poor timekeeping	-12
Ticket issuing faults	-08
Failure to stop	-11
General carelessness	-11
Excessive absence	-09
Excessive shortages	-08
Complaints	-11
Commendations	09
Average lateness	-14
Average absence	-18
Cash shortages	-13
Total offences	-16
Verbal warnings	-13
Collisions - vehicles	-11
Collisions - pedestrians	-08
Collisions - objects	-10
Vandalism outside	-12
Total collisions	-09
Total non-collisions	-07

Factor 6: Intelligence (high)

Poor timekeeping	12
Ticket issuing faults	10
Average lateness	13
Shortages (average weeks)	-16
Average total offences	12
Collisions - vehicles	10
Collisions - objects	15
Total collisions	11

The first and fifth factors had the largest number of statistically significant correlations with the criteria. Factor 1 suggests that the less tolerant drivers are more likely to have worse offence records and more accidents than those who are not. They are also more likely to be late for, or absent from, work more often and to record a shortage in paying-in cash. A similar pattern (although with fewer significant correlations) is found for Factor 3, extroversion. The opposite of these is suggested by Factor 5, namely that the older drivers and those with higher standards are less likely to have bad disciplinary records and accidents. It is those drivers who receive more commendations from members of the public, and fewer complaints - the reverse of the case with of who are less tolerant.

There were only two correlations with the second factor - anxiety - which accounted for over 13% of the variance, and three with the fourth factor - risk. The latter suggests that those with a higher "risk" score (mainly from the WRT) are less likely to receive commendations, and more likely to have disciplinary entries both for general carelessness and the quality of their driving. The final factor is less easy to explain, as it suggests that the more intelligent drivers have less good disciplinary and accident records, although they are less likely to record cash shortages.

A number of the disciplinary action categories also have significant correlations with the test factors, and some of these have been added to the lists above. "Verbal warnings" for offences, for example, correlated positively with (low) tolerance negatively with (high) standards. "Suspensions" for offences correlated negatively with both (high) imagination/risk and (low) standards. Most of the actions taken in respect of accidents did not correlate significantly with the factors, except for anxiety and intelligence. For the latter, "verbal warnings" and "suspensions" correlated positively.

7.4.2 All cases, split by age

(a) 40 years of age or below

Factor 1: Tolerance (low)

Poor timekeeping	10
Rudeness	09
General carelessness	13
Driving faults	11
Excessive absence	14
Excessive shortages	11
Miscellaneous offences	13
Complaints	10
Average lateness	12
Average absence	11
Total offences	17
Verbal warnings	16
Collisions - animals	14
Collisions - objects	15
Total collisions	12
Total non-collisions	10

Factor 2: Anxiety (low)

Rudeness	-11
General carelessness	-10
Shortages (average weeks)	-16
Dismissed then reinstated	11
Collisions with vehicles	12
Accidents aboard buses	10
Vandalism - outside	-13
Suspensions	10

Factor 3: Intelligence (high)

Shortages	-30
Collisions - vehicles	14
Vandalism - outside	-12
Vandalism - inside	-09

Factor 4: Sensitive/risk (low)

Driving faults	-21
Excessive absence	-12
Excessive shortages	-13
Suspensions	-10
Collisions - vehicles	-10
Miscellaneous accidents	-11
Written warnings	-12

Factor 5: Extroversion (high)

General carelessness	11
Excessive shortages	14
Average lateness	15
Total offences	12
Written warnings	13
Suspensions	11
Vandalism - inside	-12
Total collisions	11

Factor 6: Age/standards (high)

Ticket issuing faults	-12
General carelessness	-18
Miscellaneous offences	-13
Complaints	-13
Shortages	12
Total offences	-16
Verbal warnings	-10
Suspensions	-11
Collisions - vehicles	-12
Collisions - objects	-16

(b) Greater than 40 years of age

Factor 1: Anxiety (low)

Driving faults	-10
Miscellaneous offences	11

Factor 2: Intelligence (high)

Cash shortages	-21
Suspensions	16
Accidents aboard bus	15
Vandalism inside	11

Factor 3: Extroversion (high)

Driving faults	-15
Average absence	18
Shortages	14
Collisions - pedestrians	12
Written warnings	-12
Suspensions	-11

Factor 4: Conscientiousness (high)

No correlations with offence/ accident variables

Written warnings (Offences)	-11
Suspensions (Accidents)	-11
Worst action (Accidents)	-16

Factor 5: Age/risk (high)

Commendations	11

Factor 6: Toughness (high)

Boarding/alighting	-12
Total collisions	10

Factor 7: Tolerance (high)

Rudeness	-10
Boarding/alighting	17
Total collisions	-14

The most obvious difference between the two groups is that the younger group had far more significant correlations than the older group. The correlations for the younger group were similar to those for the overall sample. Factors 1 and 5 were still more or less limited to general indiscipline and high accidents, although it is worth noting that the more extrovert drivers in this group have fewer cases of vandalism occurring inside their buses - presumably their personality causes them to take steps to stop any occurrences of this. This may also be the case with the more intelligent in this group - they have fewer instances of both kinds of vandalism (inside and outside the vehicle) and perhaps use their intelligence to avoid its occurrence. It may also be that they are more meticulous in reporting incidences of this which other drivers may consider to be too minor or unimportant to bother about. They also had a very high correlation (for this survey) with cash shortages, $r=-.30$ at $p=.001$.

The correlations with the anxiety factor suggest that the more anxious drivers will be more careful in the way they carry out their duties (in terms of fewer cases of rudeness, general carelessness and cash shortages), although they have more collisions with other vehicles and more accidents aboard their own buses. The latter could again be a function of recording - the anxious drivers may be those who are more conscientious in reporting all such incidents; those who worry less may overlook trivial cases where little or no injury occurred.

Similar patterns occured as with the overall group regarding disciplinary actions taken against the younger group, with the more argumentative, more extrovert and older/low standards people having more warnings and suspensions.

A different picture emerged for the older age group, with the test factors showing very few statistically significant correlations with the criteria. Total offences did not correlate with any of the factors. The anxiety factor which accounted for nearly 15% of the variance, was only correlated with driving quality (negative) and miscellaneous offence reports. There was a similar pattern to the other group with the intelligence factor - the more intelligent had fewer cash shortages and more reports of both vandalism and passenger accidents inside buses. This may well have been for the reasons discussed above. They also tended to have more serious levels of disciplinary action on their records for offences (for example, a correlation of $r=.15$ for "worst action" at $p = .009$). Factor 6 in this group was not shared with either the overall or the younger groups, and was labelled "toughness". The more tough-minded drivers, it would appear, have fewer reports of boarding/alighting accidents. It may be the case that they have genuinely fewer cases of this nature; alternatively, it may be that (like the extroverts in the previous paragraph) they consider some incidences to be too trivial to report, or they "persuade" people not to complain. They do, however, have worse levels of disciplinary action awarded against them.

Factor 2 is also negatively-weighted, implying that the more intelligent drivers over the age of 40 will have fewer cash shortages but will report more non-collision accidents (particularly passenger accidents and interior vandalism) and will have been disciplined more for errors in issuing tickets. They will also have had worse disciplinary action taken against them. It is a matter of speculation as to whether these people are using their intelligence to find ways of issuing wrongly-printed tickets in the hope of keeping the surplus cash.

7.4.3 Analysis by size of depot

The third method of breakdown of these data was to look at the differences between large and small depots, the dividing line being at 100 drivers. The following tables illustrate the significant correlations with the test factors derived in the earlier analysis.

(a) Small depots (less than 100 drivers)

Factor 1: Anxiety (low)

Average lateness	-34
Cash shortages	-20
Boarding/alighting accidents	-19
Vandalism inside	19

Factor 2: Intelligence (high)

Poor timekeeping	14
Excessive shortages	-18
Commendations	-16
Collisions - animals	15
Collisions - vehicles	14
Vandalism inside	-14
Dismissed then reinstated	-17

Factor 3: Extroversion (high)

Written warnings	17
Final warnings	18
Suspensions	17
Collisions - vehicles	19
Collisions - animals	18
Total collisions	19
Total non-collisions	18
Written warnings	15

Factor 4: Tolerance (low)

Commendations	-22
Collisions - vehicles	15
Total collisions	15

Factor 5: Conscientiousness (high)

Rudeness	-16
Average lateness	-50
Collisions - pedestrians	-14
Collisions - objects	15
Accidents aboard bus	-16
No action	-15
Verbal warnings	15

Factor 6: Risk (high)

Miscellaneous accidents	18

Factor 7: Thoughtfulness

Ticket issuing faults	19
Quality of driving	-15
Excessive absence	-15
Accidents aboard bus	-18
Vandalism (inside)	14

(b) Large depots

Factor 1: Tolerance (low)

Poor timekeeping	10
Rudeness	10
General carelessness	08
Excessive absence	12
Excessive shortages	12
Complaints	08
Commendations	-09
Average lateness	11
Average absence	16
Shortages	10
Total offences	14
Verbal warnings	15
Collisions - objects	12
Total collisions	08

Factor 2: Extroversion (high)

General carelessness	11
Excessive shortages	17
Miscellaneous offences	11
Average lateness	12
Average absence	12
Cash shortages	11
Total offences	14
Verbal warnings	10
Written warnings	13
Dismissed then reinstated	08

Factor 3: Intelligence (high)

Poor timekeeping	09
Ticket issuing faults	11
Average lateness	13
Cash shortages	-18
Total offences	10
Dismissed then reinstated	08
Collisions - vehicles	09
Collisions - objects	16
Accidents aboard bus	11
Vandalism outside	-08
Total collisions	14
Verbal warnings	16
Suspensions	09

Factor 4: Conscientiousness (high)

Poor timekeeping	-09
Failure to stop	-08
General offences	-13
Complaints	-09
Average absence	-15
Average lateness	-12
Total offences	-14
Verbal warnings	-11
Suspensions	-11
Collisions - vehicles	-09
Collisions - objects	-13
Vandalism outside	-08
Total collisions	-14
No action	-15

Factor 5: Risk (high)

Commendations	15
Quality of driving	09
Average absence	-10
Cash shortages	-12
Suspensions	11

Factor 6: Anxiety (high)

Dismissed then reinstated	-09
Accidents aboard bus	-09
Vandalism outside	09
Miscellaneous accidents	-11
Total collisions	-08
Suspensions	-08

There are some differences between the two size groups, with the large group having far more significant correlations than the smaller one. This may be a function of sample size, with the former having approximately three times as many cases as the latter. Anxiety came as the first factor with the small depots, where the less anxious drivers are more likely to be late for work, have cash shortages and boarding/alighting accidents but are less susceptible to vandalism inside. In the larger depots (where this factor was the last to emerge) the more anxious appear to have fewer accidents, perhaps taking more care in busy traffic conditions.

The extroversion factor had differences between the two groups, with it containing mostly accident criteria (and disciplinary actions for offences) in the small depots and exclusively offence data in the large ones. The more extrovert drivers in the small depots are more likely to have accidents of all types with the highest correlation coefficient being for average collisions. In the larger depots this factor is correlated mainly with general carelessness, cash shortages and absenteeism and with disciplinary actions for offences. As was found with other groups, the tolerance factor in the large depots was also linked with many of the offence categories. This was not the case in the small depot group, however, where the factor was negatively correlated with commendations (as might be expected) and positively with both total collisions and collisions with other road vehicles.

The two groups were reasonably similar regarding the intelligence factor. It would appear that the clever drivers in small depots are more likely to collide with animals and vehicles, but to be less often dismissed for accidents and to have fewer cash shortages and commendations. In the larger establishments, however, it was positively related to a number of offence and accident categories (eg. ticket issuing; collisions with vehicles and inanimate objects), but negatively to cash shortages and exterior vandalism.

The conscientiousness factor also shows some differences. In the small group it had a very high negative correlation with lateness, implying that the drivers with low standards are late in reporting for work. The remaining correlations are within the typical range for this study. Interestingly, "conscientiousness" was positively correlated with both collisions with inanimate objects (perhaps these drivers are concerned to avoid accidents with living beings but are less worried when it comes to objects) and verbal warnings for accidents. The correlations in the large group (including collisions with objects) were all negative.

The remaining factors also had some interesting differences. In the small depots risk-takers had more miscellaneous accidents. The more thoughtful drivers (factor 7, based on M and two intelligence measures) were more likely to have ticket issuing offences on their records, but less likely to be reported for poor driving, to be absent without leave and to experience accidents aboard their vehicle. They were, however, more likely to experience vandalism inside their buses. In the large depots, however, the "risk-takers" were more likely to be disciplined for poor driving quality, and to be suspended more, but to be absent less and report fewer cash shortages. They were also likely to have received more commendations.

7.4.4 Summary

In this section the first indications have emerged as to which personality and ability factors might make for good or bad performance in the job. On the whole, a "good" bus driver would appear to be one who is tolerant, has high standards and is conscientious, and is not particularly intelligent. The "poor" drivers, on the other hand, would appear to be characterised by an extrovert personality, with low anxiety, a lack of both tolerance and standards, but who are intelligent. The next section examines the pattern of factors underlying the performance variables.

7.5 Factor analysis of criterion variables

This section presents and discusses the results of the factor analysis of the criterion variables, in other words, those intended to provide the measures of driver "performance". A similar process to that described above was followed to select which variables would be analysed: an a priori examination of the correlation matrices suggested that the eight basic offence categories (poor timekeeping, ticket issuing faults, etc), commendations and the eight basic accident categories (four collision types, vandalism and on-board accidents) would be most suitable. Once again, the variables shown under each factor were those derived and sorted by the program. On occasions some of the other variables also had high loadings for particular factors, and these are shown in brackets under each factor. A format similar to that used with the test variables was followed, analysing first the data as a whole, then breaking it down by age group and by depot category.

7.5.1 All cases

The following seven factors emerged when the complete set of data was factor analysed.

Ftr	Var.	Variables	Loading	Label
1	10.9%	Poor timekeeping	71	General poor
		Ticket issuing faults	60	performance
		Collisions - vehicles	55	(inaccuracy)
		Failure to stop	42	
		[Aboard bus accidents	42]	
		[General carelessness	38]	
2	6.0%	Vandalism (outside)	64	Vandalism
		Vandalism (inside)	50	
		[Ticket issuing faults	-20]	
3	4.8%	Rudeness	-41	"Complaints"
		Quality of driving	-25	
		Commendations	-21	
		[Ticket issuing faults	-34]	
		[General carelessness	-24]	
		[Excessive absence	-23]	
		[Poor timekeeping	-21]	
		[Vandalism - outside	20]	
4	6.5%	Collisions - objects	92	Non-human
		Collisions - animals	40	collisions
5	2.8%	Excessive shortages	-69	Excesses
		Excessive absence	-54	
		General carelessness	-40	
		[Poor timekeeping	-26]	
6	2.9%	Aboard bus accidents	61	On-board
		Boarding/alighting	51	accidents
		[Collisions - objects	38]	
7	1.6%	Collisions with people	38	Human
		[Collisions with vehicles	32]	collisions

Total variance accounted for was 35.5%

The interpretation of these factors is more complicated than for the test factors, as little reference can be made to past studies. There appears to be little interrelationship between the offence variables and the accident ones, with factors involving the latter being easier to interpret. The second factor concerns vandalism, the fourth, "non-human" accidents, the sixth, on-bus accidents and the seventh, "people" accidents. The dichotomy between collisions involving people and collisions involving "non-humans" is interesting, as it was hinted at in the correlations chapter. The first and third factors can be interpreted as being of general poor performance, with perhaps the former being to do with inaccuracy (such as incorrect issuing of tickets and failing to stop at bus stops) and the latter to do with the subjects of complaints (rudeness and quality of driving), although it is interesting that commendations should be positively associated with these. Factor five could be interpreted as "not doing things" - not reporting for work, not cashing-up correctly and general slackness. The next table illustrates the intercorrelations between the factors:

	1	2	3	4	5	6	7
1	-						
2	02	-					
3	-25	10	-				
4	-02	01	04	-			
5	-14	-13	11	-02	-		
6	07	-03	05	12	04	-	
7	17	-01	12	-06	05	00	-

1. General offences (high)
2. Vandalism (high)
3. "Complainable" offences (low)
4. Collisions - "non-human" (high)
5. Excesses (low)
6. On-board accidents (high)
7. Collisions - "human" (high)

There were fairly high intercorrelations between the three offence categories - 1, 3 and 5. Factor 5 also correlated negatively with vandalism. This illustrates another finding of the correlations, that drivers suffering vandalism tended to have fewer offences. "Human" collisions were positively related to factor 1 and negatively to factor 3; "non-human" collisions to on-board accidents.

7.5.2 Data subdivided by age

(a) Aged 40 or less

Ftr	Variance	Variables	Loading	Labels
1	10.7%	Collisions - vehicles	75	Human collisions/ general offences
		Ticket issuing faults	55	
		Poor timekeeping	48	
		Failure to stop	38	
		Collisions with people	19	
		[Aboard bus accidents	41]	
		[General carelessness	31]	
		[Quality of driving	18]	
2	5.3%	Rudeness	-39	"Complaints"
		Quality of driving	-44	
		Commendations	-20	
		[Poor timekeeping	-45]	
		[Ticket issuing faults	-30]	
		[Aboard bus accidents	-30]	
3	6.3%	Excessive shortages	64	Excesses
		Excessive absences	60	
		General offences	50	
		[Poor timekeeping	30]	
		[Rudeness	26]	

Ftr	Variance	Variables	Loading	Labels
4	6.0%	Collisions - objects	65	Non-human
		Collisions - animals	34	collisions
5	3.1%	Vandalism (outside)	66	Vandalism
		Vandalism (inside)	53	
6	2.3%	Aboard bus accidents	63	On-board
		Boarding/alighting	57	accidents
		[Collisions - objects	46]	

Total variance accounted for was 33.7%

Correlations between factors:

	1	2	3	4	5	6
1	-					
2	-12	-				
3	09	-13	-			
4	-04	01	00	-		
5	00	19	07	03	-	
6	01	-04	-01	16	-08	-

1. General offences and "human" collisions (high)
2. General offences (source of complaints) (low)
3. Excesses (high)
4. Collisions - "non-human" (high)
5. Vandalism (high)
6. Aboard-bus accidents (high)

Most of the factors were similar to those for all cases described above, with the exception that the first was an amalgam of general bad performance and "human collisions". It might be described as a lack of concern for people, containing in addition as it does accidents aboard buses and quality of driving, for example. There were only three fairly large correlations of note: between this factor and the second one (subject of complaints); factors 2 and 6 (on-board accidents) - again, in combination, these might be called a general "lack of concern for people", with both accidents involving people and rudeness and poor driving quality;

and factors 4 ("non-human" accidents) and 6 - perhaps suggesting a general accident proneness.

The next table gives the factors, and their intercorrelations, for those over 40:

(b) <u>Age greater than 40</u>

Fctr	Variance	Variables	Loading	Label
1	12.2%	Ticket issuing faults	71	General offences
		Fail to stop	69	
		Poor timekeeping	68	
		General offences	57	
2	5.7%	Vandalism (outside)	70	Vandalism
		Vandalism (inside)	40	
		Poor quality of driving	39	
3	3.4%	Boarding/alighting	53	Human accidents
		Aboard bus accidents	39	
		Collisions - vehicles	36	
4	7.2%	Collisions - objects	1.12	Non-human collisions
		Collisions - animals	48	
5	5.4%	Excessive shortages	-47	Rudeness/ shortages
		Rudeness	31	
		Commendations	26	
		[Ticket issuing faults	31]	
6	3.7%	Excessive absences	73	Excesses
		[Excessive shortages	38]	
7	2.1%	Collisions - people	-52	Human collisions
		[Vandalism (outside)	-21]	
		[Rudeness	-19]	

Total variance accounted for was 39.7% (the largest in this section).

Correlations:

	1	2	3	4	5	6	7
1	-						
2	06	-					
3	15	-05	-				
4	03	-04	-01	-			
5	21	-08	07	-04	-		
6	17	04	-12	06	-03	-	
7	-06	-06	-06	00	01	-01	-

1. General offences (high)
2. Vandalism (high)
3. Human accidents (high)
4. Non-human collisions (high)
5. Rudeness/low shortages (high)
6. Excesses (high)
7. Human collisions (low)

These factors had less similarity to the overall group, and tended to be more discrete than with the younger age group: there were very few variables from other factors which loaded heavily on them, the exception being factor 6. Factor one had no accident variables loaded onto it; vandalism and poor driving quality formed a factor and the third was "human accidents" with one collision category and two non-collision categories. "Excessive shortages" loaded both onto rudeness/commendations and onto excessive absence, and collisions with people formed a factor with vandalism and rudeness being loaded. The highest correlations amongst factors all involved factor 1, with factor 3 (bad performance/people accidents), with factors 5 and 6 (both general poor performance).

7.5.3 Division by depot size

(a) Small depots

Fctr	Variance	Variables	Loading	Label
1	9.5%	Ticket issuing faults	64	General offences/ accidents
		Poor timekeeping	53	
		General carelessness	50	
		Failure to stop	39	
		Collisions - objects	25	
		Aboard bus accidents	-34	
		Commendations	-12	
		Excessive shortages	20	

Fctr	Variance	Variables	Loading	Label
2	3.4%	Collisions - vehicles	54	Human
		Collisions - people	34	collisions
		[General carelessness	24]	
3	7.1%	Rudeness	-66	"Complaints"
		Quality of driving	-57	
		[Excessive absence	-39]	
4	5.4%	Collisions - animals	78	General
		[Aboard bus accidents	30]	accidents
		[Poor timekeeping	27]	
		[Collisions - vehicles	25]	
		[Collisions - objects	23]	
5	3.4%	Excessive absence	-77	Excesses
		Excessive shortages	-54	
		[General carelessness	-44]	
		[Failure to stop	-23]	
		[Poor timekeeping	-21]	
6	3.0%	Vandalism (outside)	50	Vandalism
		Vandalism (inside)	33	
		[Collisions - objects	-23]	
7	4.1%	Boarding/alighting accs	1.04	On-board
		[Poor timekeeping	34]	accidents

Total variance accounted for was 37.4%.

The following are the intercorrelations between these factors:

	1	2	3	4	5	6	7
1	-						
2	08	-					
3	-01	01	-				
4	07	01	11	-			
5	-26	-05	19	03	-		
6	-10	21	-06	-06	03	-	
7	12	10	07	19	01	-01	-

1. General discipline + collisions with objects (high)
2. Collisions - "human" (high)
3. Sources of complaints (low)
4. General accidents (high)
5. Excesses (low)
6. Vandalism (high)
7. Boarding/alighting (+ poor timekeeping) (high)

Factor one formed a general poor performance factor, although it is interesting that in this situation commendations (and aboard bus accidents) correlated negatively with the other variables. Factor four appeared to be a general accident factor, perhaps best termed "lack of concern". The negative relationship between vandalism and other "at fault" accidents is shown in factor six. The final factor consisted mainly of boarding/alighting accidents, though poor timekeeping was also loaded. Perhaps these have something to do with lateness - if a driver is behind schedule on a journey, he "encourages" people to board and alight quickly, causing some to lo~~o~~se their footing.

In terms of the correlations between factors, factor five ("not doing things") correlated strongly with both the first and third factors, both indications of general poor performance. Factors two and six related positively: human accidents and vandalism, as did four and seven (general "lack of concern").

(b) Large depots

Fctr	Variance	Variables	Loading	Label
1	10.7%	Collisions - vehicles	55	General offences
		Ticket issuing faults	54	
		Failure to stop	40	
		Poor timekeeping	71	
		[General carelessness	37]	
		[Aboard bus accidents	42]	
		[Quality of driving	27]	
2	6.2%	Vandalism (outside)	69	Vandalism
		Vandalism (inside)	45	
		[Ticket issuing faults	-29]	
3	4.8%	Excessive absence	-55	Excesses
		Excessive shortages	-68	
		General carelessness	-39	
		[Poor timekeeping	-26]	
4	7.6%	Collisions - objects	1.03	Non-human collisions
		Collisions - animals	39	
5	3.0%	Quality of driving	28	Complaints
		Rudeness	35	
		Commendations	22	
		[Ticket issuing faults	28]	
		[Vandalism - outside	-23]	
		[General carelessness	24]	
6	3.1%	Aboard bus accidents	-61	On-board accidents
		Boarding/alighting accs	-52	
		[Collisions - objects	-42]	
7	1.8%	Collisions - people	38	Human collisions
		[Collisions - vehicles	41]	
		[Ticket issuing faults	26]	
		[General carelessness	23]	
		[Failure to stop	22]	

Total variance accounted for was 37.2%.

Correlation matrix:

	1	2	3	4	5	6	7
1	-						
2	-05	-					
3	-13	-09	-				
4	-03	03	-01	-			
5	20	-14	-09	-05	-		
6	-06	03	-05	-11	05	-	
7	22	-03	03	-09	-09	00	-

1. General offences (high)
2. Vandalism (high)
3. "Complaints" (low)
4. Collisions - non-human (high)
5. Excesses (high)
6. On-board accidents (low)
7. Collisions - "non-human" (high)

As with the test data, the pattern for the larger depots bore marked similarities to the overall situation. Amongst the larger correlations, factor five (poor performance that invites complaints) was strongly related positively to factor one (poor performance in general) and negatively to factor two (vandalism). Factor one also correlated strongly with factor three ("not doing things") and with factor seven ("human accidents").

7.5.4 Summary

One or two comments can be made at the end of this section. As with the predictor variables, a number of fairly clear factors emerged from the analysis of the criterion data. These tended to be divided into offence and accident categories, with each analysis above typically producing three or four of each. The offence factors tended to be of the order of general indiscipline, although rudeness/quality of driving did come together consistently (along with commendations, which is somewhat surprising), as did "excesses" (of cash shortages and absenteeism). The accident factors were easier to interpret, including "human" and "non-human" collisions suggested in the previous chapter on correlations, vandalism and on-board accidents.

In terms of the intercorrelations between these factors, poor performance correlated positively with human collisions and, especially with the older drivers, was associated with on-board accidents. There was a very small negative relationship between human and non-human collisions (the opposite is the case in small depots) - a stronger one might have been expected on the basis of the frequencies and correlations discussed earlier. Non-human collisions and on-board accidents correlated positively (with the exception of the older drivers); vandalism correlated negatively with excesses and, in the small depots only, positively with human collisions. The offence factors are fairly highly intercorrelated, the accident ones less so.

7.6. Correlations between test and performance factors.

The final stage in the presentation and analysis of the results from the factor analysis is to examine the correlations between the second order factors from the test data (intelligence and personality) and those emerging from the performance variables. This is the most important stage as it brings together both the predictors and criteria in an attempt to explain the determinants of bus driver performance. The factor scores from both the test and performance factors were correlated using Pearson product-moment correlation. The correlation matrices are summarised below, with only the correlation coefficients significant at p=.05 or greater being shown, and are again presented in the format of all cases, followed by sub-division by age and by depot size.

7.6.1 All cases

The following table gives the statistically significant correlations between test and performance factors for all cases. 562 cases were involved in the analysis.

Perf. factors	Test factors 1	2	3	4	5	6
1.	11**	-	-	-	-14**	14**
2.	06*	-	-	-	-12**	-
3.	-	-	-	08*	-	-07*
4.	11**	-	-	-	-08*	14**
5.	-16**	-	-12**	-	12**	-
6.	-	-	-	-	-	12**
7.	-	-	-	-08*	-10**	-

** = significant at p=0.01 or greater
* = significant between p=0.01 and p=0.05

Test factors (42.9% of variance)

1. Tolerance (low)
2. Anxiety (low)
3. Extroversion (high)
4. Risk (low)
5. Conscientiousness (high)
6. Intelligence (high)

Performance factors (35.5% of variance)

1. General offences (high)
2. Vandalism (high)
3. "Complaints" (low)
4. Collisions - non-human (high)
5. Excesses (low)
6. On-board accidents (high)
7. Collisions - "non-human" (high)

Over a third of the correlations were statistically significant and they more or less substantiated earlier findings, as detailed under the correlations between variables, and between test factors and individual performance measures. High levels of both tolerance and conscientiousness were associated with "good" performance, whereas high intelligence (and to a lesser extent, extroversion and high risk) were associated with the opposite. Anxiety did not correlate with any of the performance factors, and extroversion with only one. Performance factors 3, 6 and 7 had the fewest (and some of the lowest) correlations that were significant, while factors 1 and 5 had some of the largest.

7.6.2 Data split by age

The older drivers had one of the largest correlation matrices (7 x 7) yet the fewest number of statistically significant correlations - one. This was between test factor 3 (extroversion) and performance factor 7 (human collisions), $r=-.13$ ($p=.02$).

There were more correlations with the younger group (number of cases, 308), as the table overleaf shows.

Perf. factors	Test factors 1	2	3	4	5	6
1.	-	-	-	-	-	-16**
2.	-	-	-	-	-	-
3.	18**	-	-	-	10*	-11*
4.	16*	-	14**	-10*	-	-13**
5.	-	-10*	-12*	-	-	-
6.	-	-	-	-	-	-

** = significant at p=0.01 or greater
* = significant between p=0.01 and p=0.05

<u>Test factors</u> (43.7% of the variance):

1. Tolerance (low)
2. Anxiety (low)
3. Intelligence (high)
4. Sensitive/risk (low)
5. Extroversion (high)
6. Age/conscientiousness (high)

<u>Performance factors</u> (33.7% of the variance)

1. General offences and "people" collisions (high)
2. "Complaints" (low)
3. "Not doing things" (high)
4. Collisions - "non-human" (high)
5. Vandalism (high)
6. Aboard-bus accidents (high)

The strongest relationships involved tolerance, intelligence and conscientiousness, again in the direction expected. As previously, the anxiety and extroversion factors had fewest statistically significant correlations. Unlike the overall group, the performance factors with the most correlations were 3 (excessive absence and cash shortages) and 4 (non-human collisions). Offences (sources of complaint) and on-board accidents had none; the remaining ones had only one or two.

6.3 Division by depot size

The next two tables present the correlations between test and performance factors for both small and large depots.

(a) Small depots (137 cases)

Perf. factors	Test factors 1	2	3	4	5	6	7
1.	-	-	-	-	14**	15**	14*
2.	-	-	19**	15**	-	-	-
3.	-	-	-	-	-	14**	-
4.	-	17*	18*	-	-	-	-
5.	-	-	-	-15*	-	-	-
6.	-	-	-	-	-	15*	14*
7.	-19**	-	-	-	-	14*	14*

** = significant at p=0.01 or greater
* = significant between p=0.01 and p=0.05

Test factors (47.5% of the variance)

1. Anxiety (low)
2. Intelligence (high)
3. Extroversion (high)
4. Tolerance (low)
5. Conscientiousness (high)
6. Risk (high)
7. Thoughtfulness (low)

Performance factors (37.4% of the variance)

1. General discipline + collisions with objects (high)
2. Collisions - "human" (high)
3. Sources of complaints (low)
4. General accidents ("lack of concern") (high)
5. Excesses ("not doing things") (low)
6. Vandalism (high)
7. Boarding/alighting (+ poor timekeeping) (high)

(b) Large depots (425 cases)

Perf. factors	Test factors 1	2	3	4	5	6
1.	-	-	12**	-13**	-	-
2.	-	-	-08*	-	-	08*
3.	-15**	-15**	-	09	-	-
4.	11**	-	14**	-11**	-	-
5.	-	-	-	-	12**	-
6.	-	-	-13**	-	-	08*
7.	-	-	-	-11**	-	-

** = significant at p=0.01 or greater
* = significant between p=0.01 and p=0.05

Test factors (43.9% of the variance)

1. Tolerance (low)
2. Extroversion (high)
3. Intelligence (high)
4. Conscientiousness (high)
5. Risk (high)
6. Anxiety (high)

Performance factors (37.2% of the variance)

1. General offences (high)
2. Vandalism (high)
3. "Complainable" offences (low)
4. Collisions - non-human (high)
5. Excesses (high)
6. On-board accidents (low)
7. Collisions - "non-human" (high)

As with the younger drivers, the correlation coefficients in the small depots were higher in general than in the large establishments. In the small depots the test factors with the most significant correlations with performance factors were risk (four significant correlations), thoughtfulness (3) and extroversion and tolerance (2 each). The remaining three had one each. By contrast, in the large depots, intelligence and conscientiousness had the highest number of significant correlations (4 each) with risk and extroversion having only one each. In terms of the performance factors, in the small depots human collisions and boarding and alighting accidnts had the most; in the large depots, it was sources of complaint and non-human collisions which had the most.

The small depots had the most and highest correlations involving the "risk" factor - that based on the "WRT Wrong" variable. In three of the correlations - with performance factors 1 (general discipline plus collisions with objects), 6 (vandalism) and 7 (boarding/alighting accidents) there was a positive correlation between high risk and poor performance. In the other correlation involving this factor, that with "complainable offences" in the small depots (rudeness and quality of driving) the relationship was negative. This is unexpected and goes against what might be expected - that the high risk drivers receive fewer complaints about rudeness and the quality of their driving than the low risk ones. To counter this hypothesis, however, one must remember that this just occurred in the smaller depots where the sample size (137) was lower than in the other group (425).

7.6.4 General comments

An analysis of the correlations between test and performance factors has produced relationships more or less as expected, on the basis of the previous discussions. The factors which make for good performance (or, rather, fewer accidents and disciplinary offences) are high tolerance and standards, high anxiety and introversion. Those who are extrovert, intelligent and (in some cases) have high risk tend to be worse performers, as measured by more accidents and disciplinary offences.

CHAPTER EIGHT

SUMMARY AND CONCLUSIONS

8.1 Introduction

This, the final chapter, summarises and concludes the report of the research which was carried out. The first section summarises the main points of each chapter and the second reviews the methodological approach. The final part concludes the thesis by examining the research in the context of the two questions posed at the start.

8.2 Summary

The first chapter put the research in context, by dealing with the history of the British bus industry, from its early beginnings in the horse bus era of the nineteenth century, through the first mechanical buses at the turn of the twentieth century and the formation of some of the companies which have continued to this day. The hectic and fiercely competitive environment of the 1920s gave way to the highly regulated and more stable atmosphere of the 1930s. The basic structure of the industry was established in that decade: in addition to the railways there were three categories of operators - municipals, teritorials and independents. This structure evolved slowly and changed little over the next fifty years, despite nationalisation and the formation of PTAs, and despite a steady decline in bus usage with the spread of private cars.

All this changed in the present decade, with the "deregulation" of firstly express and then local services, the privatisation of the National Bus Company and the general necessity for bus operators to improve efficiency and respond to the needs of the market. Security and slow evolution gave way to free competition and rapid change. For the Scottish Bus Group this involved a major market analysis project and internal restructuring.

The second chapter continued to put the research into context, by studying some historical aspects of the driver's job. Conditions have altered much over the years, with the job losing and gaining popularity and status at different times. The 1960s were perhaps one of the worst periods for the industry, with high employment providing problems of recruitment and retention of staff for the companies, and there being much in the way of industrial action. Several authors have also criticised the quality of bus company management for failing to attack the industry's problems, which were becoming apparent in the 1960s.

A review of the Scottish Bus Group then followed, showing that labour costs had fallen in the past decade with the spread of OMO (one-man-operation), that industrial relations were in general peaceful and that (compared with other major operators) the Group was relatively efficient. The job of the bus driver was then analysed, in terms of tasks (eg, driving, ticket issuing), requirements (courtesy, following rules) and environment (legal regulation, recent changes in company structure).

The third chapter reviewed literature pertinent to the research, in terms of the long history of the use of psychological tests to recruit and measure the performance of drivers. This provided justification for the general approach used in this research, and some inspiration for the classification of performance data. Three fairly distinct historical phases were identified for bus drivers: (i) pre-1940, where the emphasis was on using mechanical-type tests to measure qualities such as reaction time and visual acuity; (ii) the 1940s-1950s when paper and pencil tests became more popular in measuring personality and intelligence; and (iii) the 1960s to the present, when a variety of qualitative and quantitative studies have been carried out but without the central themes which characterised the earlier periods. A review of literature using similar techniques for other categories of driver (such as trucks and cars) found similar use of psychological tests.

Research methodology was discussed in the next chapter, both from a theoretical and a practical perspective.

The major theories underlying the research were discussed - those principally of Cattell and Randell - along with a consideration of research design ("ex-post facto") as a prelude to introducing the methodology. This was to take predictive measures of driver behaviour (from biographical data and psychological tests) and analyse them with the criteria of actual performance on the job. The strengths and weaknesses of the predictors and criteria were discussed along with a description of and justification for the actual measures employed.

Six hundred and seventy bus drivers in sixteen depots throughout Scotland sat three psychological tests (the Ingleton Word Recognition Test, the Cattell "Culture Fair" test of "g" and the Cattell 16PF). Depot response rate varied from 10% to 100%, and the reasons for this were considered. Data on job performance were then collected on 997 drivers from 12 depots, both those tested and those not. Problems with collection of this data were also reviewed.

The next three chapters analysed this data, on three levels: descriptive statistics (frequencies, means and standard deviations), correlations both among groups of variables and between predictors and criteria, and finally multivariate analysis. Factor analysis was the method employed to reduce the large number of variables to a smaller number of underlying factors.

Chapter five discussed the variables collected, at a descriptive level. Taking the psychological tests first, the results indicated that, as a group, the sample of bus drivers were less intelligent than the general population, but had a lower propensity to take subconscious risks. On the personality questionnaire, although the means were within one standard deviation of the population mean, four scales were significantly above average (A, F, N and O) and four below (C, E, M and Q1).

The "background" data was also analysed in this section: the small depots tended to have older and longer-serving drivers. Application form data (where available) showed that half the present drivers possessed a PSV licence and 15% a HGV licence when they applied for their present position. Around a third of drivers had been previously employed by their company, a number gaining re-employment even after dismissal, and others had been employed by either municipal or independent operators. The main categories of non-bus company employment were skilled and semi-skilled manual work, and "licenced" driving, often of vans or trucks. Other than trade qualifications (such as "City and Guilds") few drivers possessed much in the way of educational attainments.

The criterion measures were divided into three categories for the purposes of analysis: offences, accidents and status. The offence categories appearing most on drivers' records related to poor timekeeping (on journeys), ticket issuing faults, general carelessness and excessive cash shortages. There were some regional variations (ticket issuing faults were most common in Edinburgh and Hawick, for example) and drivers in the large depots tended to have "worse" records than those in the small ones. Accidents were divided into four collision categories and four non-collision categories, with the proportion being 2:1 respectively. The most frequently occurring types of accident were collisions with vehicles (half of the total number), followed by vandalism from outside, collisions with objects and accidents aboard buses. Vandalism was prevalent in the major urban areas, especially Hamilton and Wishaw. A hierarchy of disciplinary actions existed for both offences and accidents.

The final criterion category was the status of the driver a year after the psychological tests had been administered. 90% were still in the same position as they were, with 6% having resigned and a few either being promoted or dismissed, or having retired.

The final section of this chapter used tests of statistical significance to compare different groups of drivers. There were very few differences between those who sat the tests in each depot and those who did not, except that the latter tended to be older on average and in some cases have fewer disciplinary actions. A number of variables were significantly different between age groups (those aged 40 and under, those over 40) and between depot groups (those of less than/greater than 100 drivers).

Correlations between variables were discussed in chapter six. This examined first the intercorrelations amongst groups of variables, divided into predictor and criterion variables. [The level of statistical significance was taken at p=.05 or greater.] Taking the former of these, age, service and depot size were inter-related: the older drivers tended to have longer service and be located in the smaller depots. The intelligence test items were strongly interrelated, although "risk" (the number of words incorrectly answered on the WRT) correlated with very few items. Intelligence was related to both age (and service and joining age) and depot size: the more intelligent drivers tended to be younger, with shorter service and located in the larger depots. A fairly high proportion of the correlations involving the 16PF (both amongst factors, and between factors and both intelligence and background data) were statistically significant.

The criterion data were analysed by group (offences and accidents) and overall (offences against accidents). Taking the former group, most items were positively related - in other words, a high number of one variable was accompanied by a high number of another. The general variable correlated positively with most others.

Cash shortages was an exception to this, however, being negatively related to four other variables including poor timekeeping and rudeness. There were fewer significant correlations amongst the accident criteria: collision and non-collision categories tended to remain separate. Taking the former, there were correlations between those involving vehicles and pedestrians, and between those involving animals and objects. In the latter, those involving on-board and boarding/alighting accidents correlated, as did the two types of vandalism. Despite this apparent dichotomy between the two types of accident, the two summary variables (total collisions and total non-collisions) were strongly related to each other. In correlating offences with accidents, there were a number of significant relationships including those between the summary categories of each.

The final stage of this analysis was to correlate predictors with criteria. The good performers tended to be older, longer-serving and worked in the smaller depots. In addition, they tended to be less intelligent. Fifteen of the 16PF factors correlated with the offence criteria, those factors with the most correlations being factors E and H. As with previous analyses, there were fewer correlations involving the accident measures: the factors with the most correlations being M and N.

The penultimate chapter presented and discussed the results of the factor analysis, the method employed to reduce the large number of variables to a smaller number of underlying factors: twenty predictors formed six "test" factors and seventeen criteria were reduced to six "performance" factors.

Similar factors were derived each time an analysis was carried out, whether on all cases or data split by either age group or depot size. The main factors from the test scores were labelled as anxiety, extroversion, tolerance, conscientiousness (often related to age) and intelligence. The first four were recognisable as established second-order factors for the test; the fifth, tolerance, appeared to be "new" in the sense that no-one had reported its existance in this form, although it did bear some resemblance to "independence". The factor involving "risk" was less consistent, though in part it was related to "tough-poise".

The performance factors also appeared to be relatively consistent in the different analyses. They tended to split into offence- and accident-related, with few factors containing many of both types. Among the "offence" factors were those of general indiscipline (sometimes involving a collision category); a combination of rudeness, quality of driving and commendations (unusual as the first two are often associated with complaints) and "excesses" (absenteeism and cash shortages). The accident factors tended to be easier to explain, as they often fell into three or four fairly distinct factors: "human" collisions (those involving vehicles and people) and "non-human" ones (involving animals and objects); vandalism and "on-bus" accidents.

Three test factors consistently correlated with performance factors: conscientiousness, tolerance and intelligence. Those involving the first two were mostly in the direction expected, namely the conscientious and tolerant drivers committed fewer breaches of the rules and had fewer accidents than those who were not. The correlations between intelligence and performance were not as expected: they suggested that the more intelligent, although being more diligent in their calculations of cash taken and in preventing (or at least suffering less from) vandalism, attracted more disciplinary offences and had more accidents. The remaining test factors had fewer correlations at a statistically significant level with the performance factors, although most had some correlations with the basic performance variables. In general, extroversion, low anxiety and high risk were associated with poor performance.

8.3 Review of the research methodology

This section evaluates the approach of the research, using the scheme of Berelson and Steiner (1964). They list six objectives which behavioural scientists should strive to achieve in their methodology, which are given here along with some remarks relating them to this research (Berelson and Steiner, 1964, pp 16-17).

One objective is that the procedures are public, in terms of the method and results being both communicable and communicated. Not only should they be written down, but they should be replicable by another researcher. Hopefully this objective has been achieved in this thesis.

The second objective is that the definitions are precise. This has been at least partly achieved in this research, especially with the performance data which took the form of "number of offences of type x per driver per year" or "number of days late for duty per driver per year", and with some of the biographical data, such as age and length of service. The definitions are less precise with the psychological test data, as they were based on constructs about which knowledge is less perfect. "Intelligence", "conscientiousness" and "anxiety", for example, are expressions about which there is fairly general understanding but where different people might define them in different ways. In defence of the measures used here, however, it should be said that two of the tests were widely established and validated.

Objectivity in data collecting is another objective, namely that the investigator has to follow the data even if they go against personal preferences or ideas. This was achieved in this study: a wide variety of data was collected, rather than just taking specific areas in the hope of "proving" a particular relationship. In addition, the factor analysis of the test data was not carried out with the objective of replicating perfectly Cattell's second-order factors: an open-minded, exploratory approach in fact lead to the discovery of a "new" factor. Similarly, the relationship between intelligence and performance was the opposite to what might have been expected: no attempt was made to hide this interesting but potentially controversial finding.

This leads onto a further objective, that the findings must be replicable by another researcher. Ideally this should be possible with this research, as the data were all objective in the sense of being the results of tests and of counting up various categories of offences and accidents. Where it might be less replicable, however, is in the interpretation of the factors derived from the analyses. The naming of factors is to some extent a subjective process as was recognised earlier: one person's interpretation might be different from that of another.

The approach should be systematic and cumulative, aiming to build upon existing bodies of knowledge through the use of central concepts in order to develop theories. In this research, the existing knowledge was both from previous research into the use of tests and performance measures into "drivers" in general and bus drivers in particular, and from the cumulation of knowledge in the use of such tests to investigate human behaviour. The central concepts in this case might be the techniques of statistical analysis, from the elementary level (frequencies and means) to the more advanced (factor analysis). This research has not developed theories as such; rather it has suggested some tentative hypotheses which can be subjected to further testing, both within the original population of bus drivers in the SBG and outwith, to other groups of bus drivers and other types of driver.

The final objective is that the purposes are explanation, understanding and prediction. In this research, the first two have been attempted - an explanation of the behaviour of bus drivers and some understanding of why this takes place. The third is less certain and will benefit from the further research being undertaken into the effectiveness of improved recruitment and selection procedures.

8.4 Conclusions

This research was established five years ago with two principal aims. Firstly, to investigate the nature of the performance of bus drivers, and secondly, to improve procedures for recruiting and selecting new drivers. It is appropriate to conclude this thesis by returning to these aims to see the extent to which they have been achieved.

In examining the first, reference is made to the "systems approach" of industrial behaviour (Randell, 1966) introduced in the methodology chapter, as a way of attempting to tease out some conclusions about why drivers behave in the way they do. To take the second aim, that of improvements to selection procedures, work on this is currently in progress. Analysis here centres around both the main findings from the research and on theories of selection and productivity.

The discussion now turns to a more detailed consideration of the nature of driver performance. The systems approach provides a means of interrelating all the variables in terms of "inputs", "treatments" and "outputs". Driver performance can be seen as both the interaction of variables which make up each element, and the interaction of all three elements. It is therefore a complex process.

In this research, the inputs were the predictors of behaviour: background data (such as age and length of service) as well as scores from the psychological tests of ability and personality. These interact with each other. Similarly, the treatments also interact. In this study these were the historical aspects of both the industry and the driver's job, along with the environment in which the job takes place. The final part of the systems model is the outputs. These are the results of the drivers' inputs (personality/ability) interacting with the treatments (operating environment), consisting of disciplinary actions and accidents.

The analysis showed that the inputs interrelated to a large extent. Age had a strong influence on intelligence and various aspects of personality, for example; age and service were positively related; previous jobs and joining age were negatively related. In factor analysis six second-order factors emerged, based on the correlations between the primary variables: tolerance, anxiety, extroversion, conscientiousness, risk and intelligence. These factors themselves were interrelated, high tolerance, for example, being associated with low anxiety, high standards and low intelligence.

The "treatment" part concerns the environment in which bus driving takes place. This has a number of elements. Firstly, there is the historical aspect of the development of both the industry in general and the Scottish Bus Group in particular. The main features of the industry (at least until the time the research took place) were slow evolution since the present structure was established in the 1930s, combined with security (of routes and of subsidy) which tended to promote stagnation (of ideas and initiatives). This is linked to the nature of management which in general has tended to be of low quality, in terms of ability and imagination. This conclusion arises both from personal observation during the research and from those who have written on this (especially Johnston (1981) and Malins (1973)).

The nature of both the industry and management are interrelated: the lack of the need for change (owing to security of routes) meant that senior managers had little need to consider changes in routes, marketing and working practices. Examples of this included the slowness in implementing one-man-operation and a lack of effort in preventing the decline in bus usage in the 1960s. Similarly, lower management worked in an environment where there was little flexibility to implement new ideas, where the emphasis was on operating services in accordance with timetables and in ensuring that drivers kept to clearly defined rules. This tended to foster an inward-looking and unimaginative approach, with drivers being disciplined for seemingly minor misdemeanors, and little notice being taken of ideas for improving efficiency. This aspect is examined in more detail later.

The industry and its management are further related with the labour environment. The problems of labour recruitment and retention in the 1960s may have been in some part to do with management attitudes. This was a period of near full employment, when bus driving (and conducting) was often seen as something to do in-between "proper" jobs. Few were prepared to make a career in the industry, partly because of the poor image of the job (Richman, 1969), partly because of increased problems of traffic congestion and partly because of management attitudes towards drivers (a very strict disciplinary code and a failure to improve the working environment) (Johnston, 1981). Shortage of labour, therefore, resulted in the industry taking often poor quality people who lacked ability and commitment. The image of the job and of the industry was reduced even further by lowering standards to re-employ both those who had drifted between bus companies and those who had been previously dismissed.

These aspects of the environment have changed somewhat since the bulk of the initial research was undertaken, as the Scottish Bus Group companies now have to operate within commercial constraints, make profits (in preparation for privatisation) and compete with other operators (both on established routes and for contracts to operate subsidised services). Senior management has had to become more market- (and marketing-) orientated.

A number of innovations have appeared recently, including minibuses, the reintroduction of crew operation in some areas and more express services, as well as improved marketing, publicity and a variety of ticketing schemes.

However, the changes at lower levels have been less. The move to decentralise management (with an area manager at each depot) was not been accompanied to any great extent by decentralisation of decision-making power to depot level, with the functions of the traffic supervisors and inspectors being virtually unchanged. The bulk of route planning and scheduling still takes place at head office level. At least one company has in fact abolished the grade of area manager, reverting to the old system of traffic and maintenance supervisors at a depot reporting to their appropriate superiors at head office.

A further aspect of the "treatment" part of the model is the actual environment in which the drivers work. This includes both the size of depot (linked to the distance it is from the company head office) and the nature of the driving. At the extremes, this ranges from constantly driving in busy urban areas congested with traffic and heavy passenger loads to driving in mostly rural parts of the country where traffic is light and passengers fewer. Other parts of the environment include the nature of the passengers and services (for examples, schools and works contracts, driving in prosperous or deprived areas);

some depots have a much higher incidence of vandalism than others, for example.

The local labour market is another environmental influence: it may determine the ease with which disaffected drivers can seek alternative employment. In the past, in some areas especially, good employment opportunities elsewhere (within or outwith the bus industry) meant that drivers could easily leave or did not have to worry if they were dismissed. Particular cases were noted in earlier chapters of industries in some areas attracting drivers away from the bus industry with higher wages - the wood pulp and aluminium industries at Fort William and the North Sea oil industries at Peterhead are particular examples.

The third part of the systems model is the result of the drivers' inputs (personality/ability) interacting with the treatments (operating environment) - the "outputs". In this research (in common with similar studies, such as Ghiselli and Brown (various), Heron (1954) and McFarland and Moseley (1954)) these were mostly negative, being measured by numbers of individual offence and accident items, along with cash shortages and attendance data. As with the items comprising the inputs and the treatments, these were not discrete. Offence measures intercorrelated to suggest an aspect of general indiscipline; similarly, different types of accidents inter-related to give support to accident-proneness theories. At the same time, collisions separated into the two types of "human" and "non-human". Further, the two main aspects of performance themselves correlated, implying a driver with a poor disciplinary record will also have a bad record of accidents. Individual measures showed often strong correlations - accidents aboard buses was positively related to six offence variables.

The systems model does not examine each aspect in isolation, however; it is concerned with the inter-relationship of the three parts. One such relationship has already been mentioned: the development of the industry has affected the management philosophy, which in turn means that a rigid set of rules exist for drivers to operate under - if they deviate, they are disciplined. It is very rare, therefore, for a driver to have a clean disciplinary record. The main performance indicator is the extent of these, and accident, records. Very rarely are praiseworthy remarks noted on such records.

The input-treatment-output approach suggests that drivers with certain characteristics will produce certain types of performance under certain conditions. One of the most important of these is the relationship between intelligence and performance, with the less intelligent having fewer offences and accidents. [This is contrary to established thought, which believes that the more intelligent employees perform better, eg, Ghiselli and

Brown (1955).] The hypothesis is as follows: intelligent drivers see inconsistencies/inefficiencies in working methods and use their intelligence to discover new (and often more effective) ways of doing things. This contravenes the rules. When this is noted, a defence is to attempt to demonstrate that the "wrong" way is more effective than the established way. Punishment follows, as supervisors in an environment where intelligence is not needed, lack the power to change anything. The implication of this for selection and promotion is discussed later.

Age, service and depot size have important influences both on each other and on other variables. In the small depots (in the more rural areas of the north of Scotland and the borders) the drivers tended to be older, have longer service and "better" records; in the large depots (in the urban areas of the central belt of Scotland), consequently, average age and length of service were lower, with the drivers having "worse" records. In addition, there were personality and intelligence differences between both younger and older drivers, and between those in small and large depots, although performance did not differ significantly.

Personality factors which make for "good" performance in the job include tolerance and conscientiousness, in that drivers possessing them receive fewer disciplinary actions and have fewer accidents. The way these personality factors are thought to interact with the environment is as follows: drivers who are tolerant accept life as it is - therefore, they do not question their supervisors' actions (even if these are misguided), they do not complain when given an old bus to drive or a difficult route to operate, and do not get too annoyed when traffic is heavy or passengers awkward. Similarly, the conscientious drivers take care to keep to the timetable, issue tickets and give change correctly, and have fewer accidents.

Other factors associated with "good" performance included anxiety and introversion-extroversion. Drivers with higher anxiety tend to perform better as they are concerned to do a good job. This may take the form of, for example, attempting to make up time if their service is running late. A driver with low anxiety may not worry if he is behind schedule. Similarly, the more introvert drivers tend to be better: they may not, for example, seek to argue with passengers or supervisors.

This thesis has presented some convincing evidence to support the generation of such hypotheses; further research is needed to verify or disprove these explanations.

The second aim of the research project was to improve recruitment and selection procedures. This arose out of a concern of the Scottish Bus Group to reduce the historically high rates of labour turnover, by recruiting more people who would make committed, long-term and satisfactory bus drivers. This section looks at the nature of the problem, what has been done so far to improve methods and what future research is planned.

To some extent the nature of driver selection was a reflection of the problems of labour recruitment and retention (especially in the 1960s and early 1970s) when the job suffered from poor conditions and a poor image; it was also partly a reflection of management quality and the lack of personnel specialists to advise on more effective procedures. In many cases, selection procedures have tended to be fairly amateurish and selective. At worst, people were offered immediate employment (virtually without interview) if they possessed a PSV licence; a number of cases came to light during the collection of performance data of people being reemployed after their company had dismissed them, despite record cards being marked "do not reemploy". Some were even rehired after dismissal for smelling of alcohol.

A two part approach has been used to redesign selection procedures. Firstly, theories in the area of selection and productivity were consulted; secondly, the results from the above research have been applied.

Hunter and Schmidt's (1982) work on the impact of improving personnel selection on productivity formed a crucial part of the redesign of selection procedures. Their conclusion from reviewing the development of selection utility models, and from proposing their own, is that even a small correlation coefficient between a selection test and job performance measures can make a significant difference in productivity and cash savings.

The Word Recognition Test is currently being used to assist in the selection of new drivers at a number of depots, on the basis of the words correct score correlating with cash shortages and the risk score correlating with several accident and offence variables. The other aspect from which selection procedures were redesigned was from the research results. Several factors in particular have formed headings under which to collect evidence in a selection interview - tolerance, conscientious, anxiety, and risk (the last also based on the WRT) (Ingleton and Macandrew, 1985, 1987). Research is currently in progress to evaluate the success of these procedures.

A number of areas for future research are indicated by the foregoing. The most important is perhaps the negative relationship between intelligence and poor performance. This has important implications not only for selection but for promotion of drivers to supervisory levels and lower management, and even to more senior levels.

It implies that the less intelligent are promoted and the more intelligent fail to get promoted (perhaps causing them to leave). The hypothesis which might explain this is as follows: the intelligent drivers tend to have poorer records (in terms of more offences and accidents) and are therefore considered worse drivers. The less intelligent (providing they are also tolerant and conscientiousness, in particular) are considered to be better drivers as they have fewer accidents and offences. When the need arises to promote a driver to inspector or above, those with a better chance are the duller drivers. This is suggested to be because of their "cleaner" records. The cycle perpetuates itself: unintelligent supervisors praise unintelligent drivers (obey the rules) and punish intelligent ones (break the rules); unintelligent ones are promoted (on account of their "clean" records) who go on to take action against the clever ones who alter the rules in an attempt to work more efficiently.

In order to improve the quality of lower management (in particular) at a time of greater commercial and competitive pressure, the SBG should consider promoting more intelligent drivers and encouraging them to put their ideas into practice.

The obtaining of financial data on the costs of accidents (both direct, in terms of repairing damaged buses, and indirect, in terms of compensation to victims and their vehicles) is essential if calculations of the financial benefits of improved selection are to be quantified. Further, it would be useful to obtain other financial data, for example insurance premia, depot operating costs (fuel, maintenance and parts for vehicles) and other costs to add to calculations of this nature. At the very least, these could be correlated with mean test and performance scores at depot level to investigate whether differences exist.

The benefits of selecting staff on the basis of the research results are potentially very great. Firstly there are the savings in accident costs from hiring people who are likely to have fewer accidents. Secondly, there are savings in recruitment costs (advertising, interviewing, testing, administration, etc) if one selects people who are more likely to give long service and less likely to have to be dismissed for poor performance. Thirdly, there are savings in the time of the traffic supervisor and inspectors in having drivers who commit fewer breaches of the rules: by having fewer disciplinary interviews to conduct they have more time to concentrate on commercially essential matters. Finally, there are public relations advantages in having contented and satisfactory drivers who are pleasant to passengers, make few mistakes (in driving, ticketing and cash) and have few accidents. This can only enhance the image of the Scottish Bus Group.

The recent changes in the operating environment make it all the more essential for improved selection to take place. The Scottish Bus Group has had to face deregulation of both express and local services. Its responses have been to reorganise its structure and to introduce both new services and new types of service. It also has to operate all routes either profitably or through public subsidy, both being in competition with other operators.

As the 1990s approach, the Scottish Bus Group is facing the challenge of privatisation. At the time of writing it is not certain what form this will take; what is certain, however, is that the need for profit will become all the greater under private ownership. Improving the quality of new drivers selected is one way to assist in achieving this goal.

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Appendices A to D

These contain extracts from computer printout illustrating:

a) Variables sex, bus company and other employment, level of education and status broken down by depot;
b) Psychological test, biographical and performance data broken down by depot;
c) Correlation matrices of predictor and criterion variables;
d) Factor analysis results.

On the next page is a list of the abbreviations used in the printouts.

List of abbreviations used in computer printouts

Label	Description
Age	Age at time of testing
Service	Length of service at time of testing
Joinage	Age when joined bus company
Carlic	Number of years car licence held prior to joining
Prevjobs	Number of previous jobs in five years prior to joining
Depsize	Size of depot (number of drivers)
DistHQ	Distance of depot from company head office
WRTRight	Score of words correct on WRT
WRTWrong	Score of words incorrect on WRT
CF1 to CF4	Scores on subtests 1 to 4 of Culture Fair
CFTotal	Total score on Culture Fair
SPFA to SPFQ4	Scores (raw) on 16PF scales A to Q4
AD1	Poor timekeeping
AD2	Ticket issuing faults
AD3	Failure to stop and uplift
AD4	Rudeness
AD5	General carelessness
AD6	Poor quality of driving
AD7	Excessive absenteeism
AD8	Excessive cash shortages
AD9	Miscellaneous offences
Acomp	Number of complaints
Acomm	Number of commendations
Avtotdis	Total disciplinery offences
Shorts	Cash shortages (number of weeks per year)
Avlate	Lateness (for work) - days per year
Avabs	Absence (unauthorised) - days per year
AAD2	Interview/instruction
AAD3	Verbal warning
AAD4	Written warning
AAD5	Final Warning
AAD6	Suspension
AAD7	Dismissal then reinstatement
AA01	Collisions - vehicles
AA02	Collisions - people
AA03	Collisions - animals
AA04	Collisions - objects
AA05	Boarding/alighting accidents
AA06	Accidents aboard bus
AA07	Vandalism - outside
AA08	Vandalism - inside
AA09	Miscellaneous accidents
Acol	Total collisions
Ancol	Total non-collisions
AAA1	Not at fault
AAA2	No action
AAA3	Verbal warning
AAA4	Written warning
AAA5	Final warning
AAA6	Suspension
AAA7	Dismissal then reinstatement

Appendix A1: Variable sex by depot

22 APR 88 SBG BUS DRIVER STUDY
15:34:26 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

CROSSTABULATION OF DEPSIZE BY SEX

DEPSIZE	COUNT / ROW PCT / COL PCT	SEX: MALE 1	FEMALE 2	ROW TOTAL
FRASERBURGH	11	11 100.0 1.8		11 1.8
FORRES	13	6 100.0 1.0		6 1.0
HAWICK	20	14 100.0 2.3		14 2.3
FORT WILLIAM	23	15 100.0 2.5		15 2.4
PETERHEAD	39	24 100.0 4.0		24 3.9
ALLOA	40	24 100.0 4.0		24 3.9
ELGIN	42	16 94.1 2.7	1 5.9 7.7	17 2.8
CUMNOCK	66	46 100.0 7.7		46 7.5
PAISLEY	146	77 95.1 12.8	4 4.9 30.8	81 13.2
HAMILTON	177	137 99.3 22.8	1 .7 7.7	138 22.5
WISHAW	180	63 94.0 10.5	4 6.0 30.8	67 10.9
EDINBURGH	235	167 98.2 27.8	3 1.8 23.1	170 27.7
	COLUMN TOTAL	600 97.9	13 2.1	613 100.0

ONUMBER OF MISSING OBSERVATIONS = 0

Appendix A2: Variable previous bus company employment by depot.

22 APR 88 SBG BUS DRIVER STUDY
15:27:30 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0 * * * C R O S S T A B U L A T I O N * * *

DEPSIZE
BY BUSEMP (TABULATING 1) PREVIOUS BUS CO EMPLOYMENT
0

DEPSIZE		COUNT / ROW PCT / COL PCT / TAB PCT	BUSEMP OWNCOMPY	OWN CO DISMISSED SACKED	OTHER SBG CO OTHERSBG	MUNICIPAL OR NBC NBCMUNI	INDEP	ROW TOTAL
FRASERBURGH	11	COUNT	0	0	0	0	1	1
		ROW PCT	0.0	0.0	0.0	0.0	100.0	0.5
		COL PCT	0.0	0.0	0.0	0.0	2.3	
		TAB PCT	0.0	0.0	0.0	0.0	0.5	
FORRES	13	COUNT	1	0	1	1	1	3
		ROW PCT	33.3	0.0	33.3	33.3	33.3	1.6
		COL PCT	0.9	0.0	4.3	1.7	2.3	
		TAB PCT	0.5	0.0	0.5	0.5	0.5	
HAWICK	20	COUNT	4	0	0	0	1	5
		ROW PCT	80.0	0.0	0.0	0.0	20.0	2.6
		COL PCT	3.8	0.0	0.0	0.0	2.3	
		TAB PCT	2.1	0.0	0.0	0.0	0.5	
FORT WILLIAM	23	COUNT	2	0	2	4	2	8
		ROW PCT	25.0	0.0	25.0	50.0	25.0	4.2
		COL PCT	1.9	0.0	8.7	6.7	4.5	
		TAB PCT	1.0	0.0	1.0	2.1	1.0	
PETERHEAD	39	COUNT	2	1	2	1	4	8
		ROW PCT	25.0	12.5	25.0	12.5	50.0	4.2
		COL PCT	1.9	5.3	8.7	1.7	9.1	
		TAB PCT	1.0	0.5	1.0	0.5	2.1	
ALLOA	40	COUNT	7	1	0	0	3	9
		ROW PCT	77.8	11.1	0.0	0.0	33.3	4.7
		COL PCT	6.6	5.3	0.0	0.0	6.8	
		TAB PCT	3.7	0.5	0.0	0.0	1.6	
ELGIN	42	COUNT	7	0	1	1	3	9
		ROW PCT	77.8	0.0	11.1	11.1	33.3	4.7
		COL PCT	6.6	0.0	4.3	1.7	6.8	
		TAB PCT	3.7	0.0	0.5	0.5	1.6	
CUMNOCK	66	COUNT	8	0	0	0	2	8
		ROW PCT	100.0	0.0	0.0	0.0	25.0	4.2
		COL PCT	7.5	0.0	0.0	0.0	4.5	
		TAB PCT	4.2	0.0	0.0	0.0	1.0	
PAISLEY	146	COUNT	6	1	4	7	8	18
		ROW PCT	33.3	5.6	22.2	38.9	44.4	9.4
		COL PCT	5.7	5.3	17.4	11.7	18.2	
		TAB PCT	3.1	0.5	2.1	3.7	4.2	
HAMILTON	177	COUNT	30	11	3	3	5	43
		ROW PCT	69.8	25.6	7.0	7.0	11.6	22.5
		COL PCT	28.3	57.9	13.0	5.0	11.4	
		TAB PCT	15.7	5.8	1.6	1.6	2.6	
WISHAW	180	COUNT	16	3	0	3	8	21
		ROW PCT	76.2	14.3	0.0	14.3	38.1	11.0
		COL PCT	15.1	15.8	0.0	5.0	18.2	
		TAB PCT	8.4	1.6	0.0	1.6	4.2	
EDINBURGH	235	COUNT	23	2	10	40	6	58
		ROW PCT	39.7	3.4	17.2	69.0	10.3	30.4
		COL PCT	21.7	10.5	43.5	66.7	13.6	
		TAB PCT	12.0	1.0	5.2	20.9	3.1	
		COLUMN TOTAL	106	19	23	60	44	191
			55.5	9.9	12.0	31.4	23.0	100.0

OPERCENTS AND TOTALS BASED ON RESPONDENTS
0 191 VALID CASES 262 MISSING CASES

Appendix A3: Previous employment (non-bus company) by depot.

22 APR 88 SBG BUS DRIVER STUDY
15:14:14 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0 * * * C R O S S T A B U L A T I O N * * *

DEPSIZE
BY JOBS (TABULATING 1) JOBS HELD BEFORE JOINING
0

DEPSIZE		COUNT / ROW PCT / COL PCT / TAB PCT	UNSKLLD	SEMISKLD	SKILLED	CLERICAL	MANAGER	OFFROAD	DRIVING	SELLING	FORCES	MISC	ROW TOTAL
FRASERBURGH	11	COUNT	1	3	1	0	1	0	6	0	0	0	10
		ROW PCT	10.0	30.0	10.0	0.0	10.0	0.0	60.0	0.0	0.0	0.0	2.6
		COL PCT	3.1	2.3	1.2	0.0	4.2	0.0	5.8	0.0	0.0	0.0	
		TAB PCT	0.3	0.8	0.3	0.0	0.3	0.0	1.6	0.0	0.0	0.0	
FORRES	13	COUNT	0	2	1	0	2	0	1	1	2	0	5
		ROW PCT	0.0	40.0	20.0	0.0	40.0	0.0	20.0	20.0	40.0	0.0	1.3
		COL PCT	0.0	1.5	1.2	0.0	8.3	0.0	1.0	2.4	5.1	0.0	
		TAB PCT	0.0	0.5	0.3	0.0	0.5	0.0	0.3	0.3	0.5	0.0	
HAWICK	20	COUNT	1	4	3	0	0	0	4	2	0	0	9
		ROW PCT	11.1	44.4	33.3	0.0	0.0	0.0	44.4	22.2	0.0	0.0	2.3
		COL PCT	3.1	3.0	3.5	0.0	0.0	0.0	3.9	4.8	0.0	0.0	
		TAB PCT	0.3	1.0	0.8	0.0	0.0	0.0	1.0	0.5	0.0	0.0	
FORT WILLIAM	23	COUNT	0	6	1	0	0	1	4	1	0	2	10
		ROW PCT	0.0	60.0	10.0	0.0	0.0	10.0	40.0	10.0	0.0	20.0	2.6
		COL PCT	0.0	4.5	1.2	0.0	0.0	6.3	3.9	2.4	0.0	9.1	
		TAB PCT	0.0	1.6	0.3	0.0	0.0	0.3	1.0	0.3	0.0	0.5	
PETERHEAD	39	COUNT	3	2	3	0	0	0	3	0	1	0	10
		ROW PCT	30.0	20.0	30.0	0.0	0.0	0.0	30.0	0.0	10.0	0.0	2.6
		COL PCT	9.4	1.5	3.5	0.0	0.0	0.0	2.9	0.0	2.6	0.0	
		TAB PCT	0.8	0.5	0.8	0.0	0.0	0.0	0.8	0.0	0.3	0.0	
ALLOA	40	COUNT	0	8	5	0	2	1	6	1	0	2	20
		ROW PCT	0.0	40.0	25.0	0.0	10.0	5.0	30.0	5.0	0.0	10.0	5.2
		COL PCT	0.0	6.0	5.9	0.0	8.3	6.3	5.8	2.4	0.0	9.1	
		TAB PCT	0.0	2.1	1.3	0.0	0.5	0.3	1.6	0.3	0.0	0.5	
ELGIN	42	COUNT	2	2	3	0	0	0	5	3	3	0	13
		ROW PCT	15.4	15.4	23.1	0.0	0.0	0.0	38.5	23.1	23.1	0.0	3.4
		COL PCT	6.3	1.5	3.5	0.0	0.0	0.0	4.9	7.1	7.7	0.0	
		TAB PCT	0.5	0.5	0.8	0.0	0.0	0.0	1.3	0.8	0.8	0.0	
CUMNOCK	66	COUNT	1	9	3	0	2	2	12	2	0	0	30
		ROW PCT	3.3	30.0	10.0	0.0	6.7	6.7	40.0	6.7	0.0	0.0	7.8
		COL PCT	3.1	6.8	3.5	0.0	8.3	12.5	11.7	4.8	0.0	0.0	
		TAB PCT	0.3	2.3	0.8	0.0	0.5	0.5	3.1	0.5	0.0	0.0	
PAISLEY	146	COUNT	5	20	11	3	3	3	10	3	2	0	47
		ROW PCT	10.6	42.6	23.4	6.4	6.4	6.4	21.3	6.4	4.3	0.0	12.3
		COL PCT	15.6	15.0	12.9	30.0	12.5	18.8	9.7	7.1	5.1	0.0	
		TAB PCT	1.3	5.2	2.9	0.8	0.8	0.8	2.6	0.8	0.5	0.0	
HAMILTON	177	COUNT	6	22	16	1	3	5	16	7	4	3	64
		ROW PCT	9.4	34.4	25.0	1.6	4.7	7.8	25.0	10.9	6.3	4.7	16.7
		COL PCT	18.8	16.5	18.8	10.0	12.5	31.3	15.5	16.7	10.3	13.6	
		TAB PCT	1.6	5.7	4.2	0.3	0.8	1.3	4.2	1.8	1.0	0.8	
WISHAW	180	COUNT	4	13	8	1	2	2	3	3	1	0	27
		ROW PCT	14.8	48.1	29.6	3.7	7.4	7.4	11.1	11.1	3.7	0.0	7.0
		COL PCT	12.5	9.8	9.4	10.0	8.3	12.5	2.9	7.1	2.6	0.0	
		TAB PCT	1.0	3.4	2.1	0.3	0.5	0.5	0.8	0.8	0.3	0.0	
EDINBURGH	235	COUNT	9	42	30	5	9	2	33	19	26	15	138
		ROW PCT	6.5	30.4	21.7	3.6	6.5	1.4	23.9	13.8	18.8	10.9	36.0
		COL PCT	28.1	31.6	35.3	50.0	37.5	12.5	32.0	45.2	66.7	68.2	
		TAB PCT	2.3	11.0	7.8	1.3	2.3	0.5	8.6	5.0	6.8	3.9	
COLUMN TOTAL			32	133	85	10	24	16	103	42	39	22	383
			8.4	34.7	22.2	2.6	6.3	4.2	26.9	11.0	10.2	5.7	100.0

0PERCENTS AND TOTALS BASED ON RESPONDENTS
0 383 VALID CASES 230 MISSING CASES

Appendix A4: Level of education by depot

22 APR 88 SBG BUS DRIVER STUDY
15:02:10 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0 * * * C R O S S T A B U L A T I O N * * *

DEPSIZE
BY EDUCTN (TABULATING 1) LEVEL OF EDUCATION RECEIVED
0

DEPSIZE	EDUCTN: COUNT / ROW PCT / COL PCT / TAB PCT	BASIC	OLEVELS	HIGHERS OR A LEVELS (HIGHER)	COLLEGE DIPLOMA (COLLEGE)	DEGREE (UNIV)	TRADE QUAL (TRADE)	ROW TOTAL
FRASERBURGH	11	0	0	0	0	0	1	1
		0.0	0.0	0.0	0.0	0.0	100.0	0.6
		0.0	0.0	0.0	0.0	0.0	1.2	
		0.0	0.0	0.0	0.0	0.0	0.6	
FORRES	13	3	0	0	0	0	1	4
		75.0	0.0	0.0	0.0	0.0	25.0	2.4
		6.5	0.0	0.0	0.0	0.0	1.2	
		1.8	0.0	0.0	0.0	0.0	0.6	
HAWICK	20	0	1	1	0	0	2	3
		0.0	33.3	33.3	0.0	0.0	66.7	1.8
		0.0	1.4	5.0	0.0	0.0	2.4	
		0.0	0.6	0.6	0.0	0.0	1.2	
FORT WILLIAM	23	3	0	0	0	0	2	4
		75.0	0.0	0.0	0.0	0.0	50.0	2.4
		6.5	0.0	0.0	0.0	0.0	2.4	
		1.8	0.0	0.0	0.0	0.0	1.2	
PETERHEAD	39	1	0	0	0	0	1	2
		50.0	0.0	0.0	0.0	0.0	50.0	1.2
		2.2	0.0	0.0	0.0	0.0	1.2	
		0.6	0.0	0.0	0.0	0.0	0.6	
ALLOA	40	1	3	1	0	0	4	7
		14.3	42.9	14.3	0.0	0.0	57.1	4.2
		2.2	4.1	5.0	0.0	0.0	4.8	
		0.6	1.8	0.6	0.0	0.0	2.4	
ELGIN	42	0	1	0	0	0	0	1
		0.0	100.0	0.0	0.0	0.0	0.0	0.6
		0.0	1.4	0.0	0.0	0.0	0.0	
		0.0	0.6	0.0	0.0	0.0	0.0	
CUMNOCK	66	4	0	0	0	0	0	4
		100.0	0.0	0.0	0.0	0.0	0.0	2.4
		8.7	0.0	0.0	0.0	0.0	0.0	
		2.4	0.0	0.0	0.0	0.0	0.0	
PAISLEY	146	6	16	4	1	1	11	28
		21.4	57.1	14.3	3.6	3.6	39.3	17.0
		13.0	21.6	20.0	10.0	20.0	13.1	
		3.6	9.7	2.4	0.6	0.6	6.7	
HAMILTON	177	1	10	2	0	1	19	24
		4.2	41.7	8.3	0.0	4.2	79.2	14.5
		2.2	13.5	10.0	0.0	20.0	22.6	
		0.6	6.1	1.2	0.0	0.6	11.5	
WISHAW	180	3	6	0	1	0	6	11
		27.3	54.5	0.0	9.1	0.0	54.5	6.7
		6.5	8.1	0.0	10.0	0.0	7.1	
		1.8	3.6	0.0	0.6	0.0	3.6	
EDINBURGH	235	24	37	12	8	3	37	76
		31.6	48.7	15.8	10.5	3.9	48.7	46.1
		52.2	50.0	60.0	80.0	60.0	44.0	
		14.5	22.4	7.3	4.8	1.8	22.4	
	COLUMN	46	74	20	10	5	84	165
	TOTAL	27.9	44.8	12.1	6.1	3.0	50.9	100.0

0PERCENTS AND TOTALS BASED ON RESPONDENTS
0 165 VALID CASES 448 MISSING CASES

Appendix A5: Status by depot

22 APR 88 SBG BUS DRIVER STUDY
15:34:26 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - - - - - - - C R O S S T A B U L A T I O N O F - - - - - - - -
DEPSIZE BY STATUS

DEPSIZE		COUNT / ROW PCT / COL PCT	DRIVER 1	DEPOT CN TRLLR 2	SHOP STE WARD 3	SINCE PROMOTED 4	RESIGNED 5	RETIRED OR DECEAD 6	DISMISSED 7	ROW TOTAL
FRASERBURGH	11	COUNT	9	1	1					11
		ROW PCT	81.8	9.1	9.1					1.8
		COL PCT	1.7	11.1	7.7					
FORRES	13	COUNT	4	2						6
		ROW PCT	66.7	33.3						1.0
		COL PCT	.7	22.2						
HAWICK	20	COUNT	10		2			2		14
		ROW PCT	71.4		14.3			14.3		2.3
		COL PCT	1.9		15.4			50.0		
FORT WILLIAM	23	COUNT	12	1	1		1			15
		ROW PCT	80.0	6.7	6.7		6.7			2.4
		COL PCT	2.2	11.1	7.7		2.8			
PETERHEAD	39	COUNT	21			1	1		1	24
		ROW PCT	87.5			4.2	4.2		4.2	3.9
		COL PCT	3.9			10.0	2.8		14.3	
ALLOA	40	COUNT	19		2		2		1	24
		ROW PCT	79.2		8.3		8.3		4.2	3.9
		COL PCT	3.6		15.4		5.6		14.3	
ELGIN	42	COUNT	15		1	1				17
		ROW PCT	88.2		5.9	5.9				2.8
		COL PCT	2.8		7.7	10.0				
CUMNOCK	66	COUNT	40	1	1	2	2			46
		ROW PCT	87.0	2.2	2.2	4.3	4.3			7.5
		COL PCT	7.5	11.1	7.7	20.0	5.6			
PAISLEY	146	COUNT	73		2		3	1	2	81
		ROW PCT	90.1		2.5		3.7	1.2	2.5	13.2
		COL PCT	13.7		15.4		8.3	25.0	28.6	
HAMILTON	177	COUNT	133	2	1	2				138
		ROW PCT	96.4	1.4	.7	1.4				22.5
		COL PCT	24.9	22.2	7.7	20.0				
WISHAW	180	COUNT	58		2	1	5		1	67
		ROW PCT	86.6		3.0	1.5	7.5		1.5	10.9
		COL PCT	10.9		15.4	10.0	13.9		14.3	
EDINBURGH	235	COUNT	140	2		3	22	1	2	170
		ROW PCT	82.4	1.2		1.8	12.9	.6	1.2	27.7
		COL PCT	26.2	22.2		30.0	61.1	25.0	28.6	
COLUMN TOTAL			534	9	13	10	36	4	7	613
			87.1	1.5	2.1	1.6	5.9	.7	1.1	100.0

ONUMBER OF MISSING OBSERVATIONS = 0

Appendix B1: Test data statistics by depot

22 APR 88 SBG BUS DRIVER STUDY PAGE 2
11:59:02 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE WRTRIGHT
BROKEN DOWN BY DEPSIZE

OVARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
OFOR ENTIRE POPULATION			21.5270	10.5310	611
DEPSIZE	11	FRASERBURGH	15.6364	8.4294	11
DEPSIZE	13	FORRES	32.1667	5.1153	6
DEPSIZE	20	HAWICK	21.5000	9.8274	14
DEPSIZE	23	FORT WILLIAM	19.2000	12.3126	15
DEPSIZE	39	PETERHEAD	16.6667	10.2731	24
DEPSIZE	40	ALLOA	24.2083	7.0586	24
DEPSIZE	42	ELGIN	19.3750	11.9157	16
DEPSIZE	66	CUMNOCK	17.3913	8.7394	46
DEPSIZE	146	PAISLEY	22.0625	10.3744	80
DEPSIZE	177	HAMILTON	19.6304	10.2822	138
DEPSIZE	180	WISHAW	21.4328	10.2177	67
DEPSIZE	235	EDINBURGH	24.6941	10.7269	170

0 TOTAL CASES = 613
MISSING CASES = 2 OR 0.3 PCT.

22 APR 88 SBG BUS DRIVER STUDY PAGE 3
11:59:02 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE WRTWRONG
BROKEN DOWN BY DEPSIZE

OVARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
OFOR ENTIRE POPULATION			3.9313	3.1324	611
DEPSIZE	11	FRASERBURGH	3.1818	2.7136	11
DEPSIZE	13	FORRES	4.8333	1.4720	6
DEPSIZE	20	HAWICK	5.1429	4.4869	14
DEPSIZE	23	FORT WILLIAM	3.3333	2.5542	15
DEPSIZE	39	PETERHEAD	3.3750	2.8562	24
DEPSIZE	40	ALLOA	3.2500	1.7998	24
DEPSIZE	42	ELGIN	3.9375	3.1511	16
DEPSIZE	66	CUMNOCK	3.0870	2.7392	46
DEPSIZE	146	PAISLEY	4.2375	3.0822	80
DEPSIZE	177	HAMILTON	3.7754	3.0923	138
DEPSIZE	180	WISHAW	4.1642	3.1747	67
DEPSIZE	235	EDINBURGH	4.1941	3.4043	170

0 TOTAL CASES = 613
MISSING CASES = 2 OR 0.3 PCT.

22 APR 88 SBG BUS DRIVER STUDY PAGE 4
11:59:02 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE CF1
BROKEN DOWN BY DEPSIZE

OVARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
OFOR ENTIRE POPULATION			7.7974	2.4418	612
DEPSIZE	11	FRASERBURGH	7.3636	1.6293	11
DEPSIZE	13	FORRES	10.1667	1.1690	6
DEPSIZE	20	HAWICK	6.6429	3.1282	14
DEPSIZE	23	FORT WILLIAM	7.4667	2.4456	15
DEPSIZE	39	PETERHEAD	6.7917	2.2259	24
DEPSIZE	40	ALLOA	8.8333	1.9262	24
DEPSIZE	42	ELGIN	7.8235	1.5506	17
DEPSIZE	66	CUMNOCK	7.7391	2.0810	46
DEPSIZE	146	PAISLEY	7.6420	2.0935	81
DEPSIZE	177	HAMILTON	7.4599	2.5782	137
DEPSIZE	180	WISHAW	7.9552	2.7216	67
DEPSIZE	235	EDINBURGH	8.1588	2.5218	170

0 TOTAL CASES = 613
MISSING CASES = 1 OR 0.2 PCT.

-
22 APR 88 SBG BUS DRIVER STUDY PAGE 5
11:59:02 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE CF2
BROKEN DOWN BY DEPSIZE

VARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
FOR ENTIRE POPULATION			6.6748	1.8505	612
DEPSIZE	11	FRASERBURGH	6.5455	1.3685	11
DEPSIZE	13	FORRES	7.3333	1.3663	6
DEPSIZE	20	HAWICK	6.2143	2.0821	14
DEPSIZE	23	FORT WILLIAM	6.9333	2.0517	15
DEPSIZE	39	PETERHEAD	5.6250	1.7399	24
DEPSIZE	40	ALLOA	7.5000	1.8882	24
DEPSIZE	42	ELGIN	7.0000	1.4577	17
DEPSIZE	66	CUMNOCK	5.9565	1.6049	46
DEPSIZE	146	PAISLEY	6.6049	1.6709	81
DEPSIZE	177	HAMILTON	6.4015	1.9115	137
DEPSIZE	180	WISHAW	7.0896	2.1301	67
DEPSIZE	235	EDINBURGH	6.9588	1.7486	170

0 TOTAL CASES = 613
MISSING CASES = 1 OR 0.2 PCT.

-
22 APR 88 SBG BUS DRIVER STUDY PAGE 6
11:59:02 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE CF3
BROKEN DOWN BY DEPSIZE

VARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
FOR ENTIRE POPULATION			7.7255	2.2662	612
DEPSIZE	11	FRASERBURGH	6.3636	1.8040	11
DEPSIZE	13	FORRES	9.3333	1.6330	6
DEPSIZE	20	HAWICK	7.0000	2.3205	14
DEPSIZE	23	FORT WILLIAM	6.9333	2.2509	15
DEPSIZE	39	PETERHEAD	6.6667	2.3713	24
DEPSIZE	40	ALLOA	8.2083	1.5317	24
DEPSIZE	42	ELGIN	7.7059	2.0544	17
DEPSIZE	66	CUMNOCK	7.5217	2.2972	46
DEPSIZE	146	PAISLEY	7.6296	2.2608	81
DEPSIZE	177	HAMILTON	7.4088	2.5192	137
DEPSIZE	180	WISHAW	8.0149	2.0852	67
DEPSIZE	235	EDINBURGH	8.2118	2.1156	170

0 TOTAL CASES = 613
MISSING CASES = 1 OR 0.2 PCT.

-
22 APR 88 SBG BUS DRIVER STUDY PAGE 7
11:59:02 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE CF4
BROKEN DOWN BY DEPSIZE

VARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
FOR ENTIRE POPULATION			4.8709	1.9065	612
DEPSIZE	11	FRASERBURGH	4.6364	1.5667	11
DEPSIZE	13	FORRES	6.3333	.8165	6
DEPSIZE	20	HAWICK	4.6429	2.0609	14
DEPSIZE	23	FORT WILLIAM	4.8667	2.2949	15
DEPSIZE	39	PETERHEAD	4.2083	2.0212	24
DEPSIZE	40	ALLOA	5.3333	1.4346	24
DEPSIZE	42	ELGIN	4.1176	2.0881	17
DEPSIZE	66	CUMNOCK	4.5435	1.6694	46
DEPSIZE	146	PAISLEY	5.0370	1.7709	81
DEPSIZE	177	HAMILTON	4.5328	1.9668	137
DEPSIZE	180	WISHAW	4.8806	1.9964	67
DEPSIZE	235	EDINBURGH	5.2353	1.8883	170

0 TOTAL CASES = 613
MISSING CASES = 1 OR 0.2 PCT.

Appendix B3: Test data statistics by depot (contd)

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-
 22 APR 88 SBG BUS DRIVER STUDY                                              PAGE   8
 11:59:02  **E.R.C.C. EMAS-A AMDAHL V7**  AMDAHL V7 000001 EMAS-3 (VSS)

0- - - -   D E S C R I P T I O N   O F   S U B P O P U L A T I O N S   - - - - -

 CRITERION VARIABLE   CFTOTAL
     BROKEN DOWN BY   DEPSIZE

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
0VARIABLE      VALUE  LABEL                         MEAN     STD DEV    CASES
0FOR ENTIRE POPULATION                            27.0784    6.3442      612

 DEPSIZE          11  FRASERBURGH                 24.9091    4.5487       11
 DEPSIZE          13  FORRES                      33.1667    3.4303        6
 DEPSIZE          20  HAWICK                      24.5000    7.3249       14
 DEPSIZE          23  FORT WILLIAM                26.2000    6.9200       15
 DEPSIZE          39  PETERHEAD                   23.2917    6.4772       24
 DEPSIZE          40  ALLOA                       29.8333    5.1047       24
 DEPSIZE          42  ELGIN                       26.6471    4.4150       17
 DEPSIZE          66  CUMNOCK                     25.7609    5.4454       46
 DEPSIZE         146  PAISLEY                     26.9136    5.5299       81
 DEPSIZE         177  HAMILTON                    25.8394    6.6909      137
 DEPSIZE         180  WISHAW                      27.9701    6.8046       67
 DEPSIZE         235  EDINBURGH                   28.5647    6.2150      170
0  TOTAL CASES =      613
 MISSING CASES =        1 OR    0.2 PCT.
-
 22 APR 88 SBG BUS DRIVER STUDY                                              PAGE   9
 11:59:02  **E.R.C.C. EMAS-A AMDAHL V7**  AMDAHL V7 000001 EMAS-3 (VSS)

0- - - -   D E S C R I P T I O N   O F   S U B P O P U L A T I O N S   - - - - -

 CRITERION VARIABLE   SPFA
     BROKEN DOWN BY   DEPSIZE

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
0VARIABLE      VALUE  LABEL                         MEAN     STD DEV    CASES
0FOR ENTIRE POPULATION                             9.6712    2.8177      590

 DEPSIZE          11  FRASERBURGH                  9.1250    3.6425        8
 DEPSIZE          13  FORRES                       9.6667    3.2660        6
 DEPSIZE          20  HAWICK                      11.0714    3.2217       14
 DEPSIZE          23  FORT WILLIAM                10.2308    3.4678       13
 DEPSIZE          39  PETERHEAD                   10.6842    1.7014       19
 DEPSIZE          40  ALLOA                        9.3333    2.9142       24
 DEPSIZE          42  ELGIN                        9.7500    2.8166       16
 DEPSIZE          66  CUMNOCK                      9.8478    3.1125       46
 DEPSIZE         146  PAISLEY                      9.7792    2.7175       77
 DEPSIZE         177  HAMILTON                     9.8905    2.8119      137
 DEPSIZE         180  WISHAW                       9.5303    2.8405       66
 DEPSIZE         235  EDINBURGH                    9.2317    2.7011      164
0  TOTAL CASES =      613
 MISSING CASES =       23 OR    3.8 PCT.
-
 22 APR 88 SBG BUS DRIVER STUDY                                              PAGE  10
 11:59:02  **E.R.C.C. EMAS-A AMDAHL V7**  AMDAHL V7 000001 EMAS-3 (VSS)

0- - - -   D E S C R I P T I O N   O F   S U B P O P U L A T I O N S   - - - - -

 CRITERION VARIABLE   SPFB
     BROKEN DOWN BY   DEPSIZE

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
0VARIABLE      VALUE  LABEL                         MEAN     STD DEV    CASES
0FOR ENTIRE POPULATION                             7.1542    1.9172      590

 DEPSIZE          11  FRASERBURGH                  5.7500    1.2817        8
 DEPSIZE          13  FORRES                       7.8333     .7528        6
 DEPSIZE          20  HAWICK                       7.5000    2.1750       14
 DEPSIZE          23  FORT WILLIAM                 6.3077    1.6525       13
 DEPSIZE          39  PETERHEAD                    6.2105    1.9026       19
 DEPSIZE          40  ALLOA                        6.9167    1.6918       24
 DEPSIZE          42  ELGIN                        7.1250    2.0290       16
 DEPSIZE          66  CUMNOCK                      7.0435    1.8614       46
 DEPSIZE         146  PAISLEY                      7.0779    1.7679       77
 DEPSIZE         177  HAMILTON                     7.1241    2.1401      137
 DEPSIZE         180  WISHAW                       7.0000    1.6267       66
 DEPSIZE         235  EDINBURGH                    7.5366    1.9198      164
0  TOTAL CASES =      613
 MISSING CASES =       23 OR    3.8 PCT.
-
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Appendix B4: Test data statistics by depot (contd)

22 APR 88 SBG BUS DRIVER STUDY PAGE 11
11:59:02 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE SPFC
BROKEN DOWN BY DEPSIZE

OVARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
OFOR ENTIRE POPULATION			14.2678	4.0396	590
DEPSIZE	11	FRASERBURGH	14.2500	4.0970	8
DEPSIZE	13	FORRES	12.8333	3.6009	6
DEPSIZE	20	HAWICK	13.7857	3.9648	14
DEPSIZE	23	FORT WILLIAM	13.6154	3.1501	13
DEPSIZE	39	PETERHEAD	12.3158	2.8098	19
DEPSIZE	40	ALLOA	15.0833	3.7754	24
DEPSIZE	42	ELGIN	14.1250	4.1453	16
DEPSIZE	66	CUMNOCK	13.4783	4.2622	46
DEPSIZE	146	PAISLEY	14.7922	4.0760	77
DEPSIZE	177	HAMILTON	14.1606	3.9912	137
DEPSIZE	180	WISHAW	13.9545	3.8448	66
DEPSIZE	235	EDINBURGH	14.7256	4.2676	164

0 TOTAL CASES = 613
MISSING CASES = 23 OR 3.8 PCT.

-

22 APR 88 SBG BUS DRIVER STUDY PAGE 12
11:59:06 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE SPFE
BROKEN DOWN BY DEPSIZE

OVARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
OFOR ENTIRE POPULATION			11.5017	3.9611	590
DEPSIZE	11	FRASERBURGH	11.2500	4.0267	8
DEPSIZE	13	FORRES	11.6667	3.4448	6
DEPSIZE	20	HAWICK	12.2857	3.6465	14
DEPSIZE	23	FORT WILLIAM	13.3077	4.6437	13
DEPSIZE	39	PETERHEAD	10.6316	3.5310	19
DEPSIZE	40	ALLOA	11.8750	3.5178	24
DEPSIZE	42	ELGIN	9.5625	5.1247	16
DEPSIZE	66	CUMNOCK	10.5000	3.6742	46
DEPSIZE	146	PAISLEY	11.3377	3.8886	77
DEPSIZE	177	HAMILTON	11.3431	3.8203	137
DEPSIZE	180	WISHAW	12.6818	4.2251	66
DEPSIZE	235	EDINBURGH	11.5488	3.9619	164

0 TOTAL CASES = 613
MISSING CASES = 23 OR 3.8 PCT.

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22 APR 88 SBG BUS DRIVER STUDY PAGE 13
11:59:06 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE SPFF
BROKEN DOWN BY DEPSIZE

OVARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
OFOR ENTIRE POPULATION			13.0254	4.6095	590
DEPSIZE	11	FRASERBURGH	14.2500	6.3640	8
DEPSIZE	13	FORRES	13.0000	6.2610	6
DEPSIZE	20	HAWICK	12.2143	3.7862	14
DEPSIZE	23	FORT WILLIAM	14.1538	4.2787	13
DEPSIZE	39	PETERHEAD	11.8947	3.1954	19
DEPSIZE	40	ALLOA	13.5833	4.4518	24
DEPSIZE	42	ELGIN	10.8750	4.4852	16
DEPSIZE	66	CUMNOCK	12.4565	3.8338	46
DEPSIZE	146	PAISLEY	13.0779	4.8606	77
DEPSIZE	177	HAMILTON	13.1606	4.6324	137
DEPSIZE	180	WISHAW	13.0909	4.8855	66
DEPSIZE	235	EDINBURGH	13.2012	4.6959	164

0 TOTAL CASES = 613
MISSING CASES = 23 OR 3.8 PCT.

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22 APR 88 SBG BUS DRIVER STUDY PAGE 14
11:59:06 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE SPFG
BROKEN DOWN BY DEPSIZE

OVARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
OFOR ENTIRE POPULATION			12.5712	3.3526	590
DEPSIZE	11	FRASERBURGH	12.5000	1.8516	8
DEPSIZE	13	FORRES	15.3333	2.8048	6
DEPSIZE	20	HAWICK	13.5714	3.4354	14
DEPSIZE	23	FORT WILLIAM	12.9231	2.9850	13
DEPSIZE	39	PETERHEAD	13.9474	2.1724	19
DEPSIZE	40	ALLOA	12.6667	2.8691	24
DEPSIZE	42	ELGIN	12.1250	2.8954	16
DEPSIZE	66	CUMNOCK	13.1522	3.2384	46
DEPSIZE	146	PAISLEY	12.8442	2.9158	77
DEPSIZE	177	HAMILTON	12.1095	3.6716	137
DEPSIZE	180	WISHAW	12.4091	3.3649	66
DEPSIZE	235	EDINBURGH	12.3902	3.5472	164

0 TOTAL CASES = 613
MISSING CASES = 23 OR 3.8 PCT.

22 APR 88 SBG BUS DRIVER STUDY PAGE 15
11:59:06 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE SPFH
BROKEN DOWN BY DEPSIZE

OVARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
OFOR ENTIRE POPULATION			13.1847	5.6720	590
DEPSIZE	11	FRASERBURGH	15.3750	6.1630	8
DEPSIZE	13	FORRES	13.6667	4.3205	6
DEPSIZE	20	HAWICK	13.5714	5.7608	14
DEPSIZE	23	FORT WILLIAM	15.5385	5.5169	13
DEPSIZE	39	PETERHEAD	11.2632	3.9978	19
DEPSIZE	40	ALLOA	12.1667	6.4919	24
DEPSIZE	42	ELGIN	12.1250	6.7318	16
DEPSIZE	66	CUMNOCK	12.5652	5.7837	46
DEPSIZE	146	PAISLEY	13.5325	5.8817	77
DEPSIZE	177	HAMILTON	13.0803	5.4867	137
DEPSIZE	180	WISHAW	13.5909	5.8203	66
DEPSIZE	235	EDINBURGH	13.2500	5.6257	164

0 TOTAL CASES = 613
MISSING CASES = 23 OR 3.8 PCT.

22 APR 88 SBG BUS DRIVER STUDY PAGE 16
11:59:06 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE SPFI
BROKEN DOWN BY DEPSIZE

OVARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
OFOR ENTIRE POPULATION			8.9475	3.0103	590
DEPSIZE	11	FRASERBURGH	9.8750	2.3566	8
DEPSIZE	13	FORRES	8.0000	2.7568	6
DEPSIZE	20	HAWICK	8.0000	3.0634	14
DEPSIZE	23	FORT WILLIAM	10.5385	1.9839	13
DEPSIZE	39	PETERHEAD	9.3684	2.5432	19
DEPSIZE	40	ALLOA	7.7917	3.0214	24
DEPSIZE	42	ELGIN	8.7500	2.6708	16
DEPSIZE	66	CUMNOCK	9.5217	2.4562	46
DEPSIZE	146	PAISLEY	9.1558	2.9606	77
DEPSIZE	177	HAMILTON	8.6496	2.8661	137
DEPSIZE	180	WISHAW	9.1212	3.1453	66
DEPSIZE	235	EDINBURGH	8.9512	3.3540	164

0 TOTAL CASES = 613
MISSING CASES = 23 OR 3.8 PCT.

22 APR 88 SBG BUS DRIVER STUDY PAGE 17
11:59:06 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE SPFL
BROKEN DOWN BY DEPSIZE

OVARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
OFOR ENTIRE POPULATION			8.7034	3.3437	590
DEPSIZE	11	FRASERBURGH	5.6250	3.4200	8
DEPSIZE	13	FORRES	7.0000	4.4721	6
DEPSIZE	20	HAWICK	10.7143	3.5826	14
DEPSIZE	23	FORT WILLIAM	9.6923	2.5944	13
DEPSIZE	39	PETERHEAD	10.3158	3.9165	19
DEPSIZE	40	ALLOA	8.5417	3.0500	24
DEPSIZE	42	ELGIN	9.1250	3.3640	16
DEPSIZE	66	CUMNOCK	8.8696	3.6855	46
DEPSIZE	146	PAISLEY	8.1948	3.1832	77
DEPSIZE	177	HAMILTON	8.8102	3.2097	137
DEPSIZE	180	WISHAW	9.1667	2.7712	66
DEPSIZE	235	EDINBURGH	8.3780	3.4540	164

0 TOTAL CASES = 613
MISSING CASES = 23 OR 3.8 PCT.

22 APR 88 SBG BUS DRIVER STUDY PAGE 18
11:59:06 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE SPFM
BROKEN DOWN BY DEPSIZE

OVARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
OFOR ENTIRE POPULATION			11.1542	3.4304	590
DEPSIZE	11	FRASERBURGH	10.1250	3.2705	8
DEPSIZE	13	FORRES	11.5000	2.5884	6
DEPSIZE	20	HAWICK	10.2143	3.1908	14
DEPSIZE	23	FORT WILLIAM	10.0000	3.1885	13
DEPSIZE	39	PETERHEAD	9.3158	3.4649	19
DEPSIZE	40	ALLOA	9.9583	3.5567	24
DEPSIZE	42	ELGIN	11.3125	3.3609	16
DEPSIZE	66	CUMNOCK	9.7609	3.1140	46
DEPSIZE	146	PAISLEY	11.3636	3.4102	77
DEPSIZE	177	HAMILTON	11.5036	3.1086	137
DEPSIZE	180	WISHAW	10.2121	3.7273	66
DEPSIZE	235	EDINBURGH	12.1159	3.4113	164

0 TOTAL CASES = 613
MISSING CASES = 23 OR 3.8 PCT.

22 APR 88 SBG BUS DRIVER STUDY PAGE 19
11:59:06 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE SPFN
BROKEN DOWN BY DEPSIZE

OVARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
OFOR ENTIRE POPULATION			10.9373	3.1807	590
DEPSIZE	11	FRASERBURGH	15.1250	2.4165	8
DEPSIZE	13	FORRES	13.8333	1.8348	6
DEPSIZE	20	HAWICK	11.7857	3.6623	14
DEPSIZE	23	FORT WILLIAM	11.4615	3.0718	13
DEPSIZE	39	PETERHEAD	12.4211	2.5236	19
DEPSIZE	40	ALLOA	10.9583	3.7122	24
DEPSIZE	42	ELGIN	11.2500	2.8868	16
DEPSIZE	66	CUMNOCK	11.3043	3.2855	46
DEPSIZE	146	PAISLEY	10.8701	2.9707	77
DEPSIZE	177	HAMILTON	10.7153	2.8074	137
DEPSIZE	180	WISHAW	10.9545	3.0150	66
DEPSIZE	235	EDINBURGH	10.4146	3.4426	164

0 TOTAL CASES = 613
MISSING CASES = 23 OR 3.8 PCT.

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 22 APR 88 SBG BUS DRIVER STUDY                                                   PAGE  20
 11:59:06  **E.R.C.C. EMAS-A AMDAHL V7**  AMDAHL V7 000001 EMAS-3 (VSS)

0- - - -  D E S C R I P T I O N   O F   S U B P O P U L A T I O N S  - - - - -

 CRITERION VARIABLE   SPFO
     BROKEN DOWN BY   DEPSIZE

 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
OVARIABLE        VALUE  LABEL                              MEAN      STD DEV     CASES
OFOR ENTIRE POPULATION                                   11.8627      4.1724       590

 DEPSIZE            11  FRASERBURGH                      12.8750      3.2705         8
 DEPSIZE            13  FORRES                           12.3333      4.5019         6
 DEPSIZE            20  HAWICK                           13.0000      4.6904        14
 DEPSIZE            23  FORT WILLIAM                     12.0769      2.8420        13
 DEPSIZE            39  PETERHEAD                        13.7895      3.7650        19
 DEPSIZE            40  ALLOA                            11.8333      4.0504        24
 DEPSIZE            42  ELGIN                            12.4375      4.7465        16
 DEPSIZE            66  CUMNOCK                          12.8696      4.3236        46
 DEPSIZE           146  PAISLEY                          11.5714      4.4822        77
 DEPSIZE           177  HAMILTON                         11.6277      4.0293       137
 DEPSIZE           180  WISHAW                           11.5909      4.2823        66
 DEPSIZE           235  EDINBURGH                        11.5671      4.1240       164
O  TOTAL CASES =        613
 MISSING CASES =         23 OR    3.8 PCT.
-
 22 APR 88 SBG BUS DRIVER STUDY                                                   PAGE  21
 11:59:06  **E.R.C.C. EMAS-A AMDAHL V7**  AMDAHL V7 000001 EMAS-3 (VSS)

0- - - -  D E S C R I P T I O N   O F   S U B P O P U L A T I O N S  - - - - -

 CRITERION VARIABLE   SPFQ1
     BROKEN DOWN BY   DEPSIZE

 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
OVARIABLE        VALUE  LABEL                              MEAN      STD DEV     CASES
OFOR ENTIRE POPULATION                                    9.4288      3.2748       590

 DEPSIZE            11  FRASERBURGH                       8.6250      2.7742         8
 DEPSIZE            13  FORRES                            7.6667      3.8816         6
 DEPSIZE            20  HAWICK                            8.5000      2.5944        14
 DEPSIZE            23  FORT WILLIAM                      9.6154      2.6627        13
 DEPSIZE            39  PETERHEAD                         7.7368      3.2972        19
 DEPSIZE            40  ALLOA                            10.2500      3.1794        24
 DEPSIZE            42  ELGIN                             8.3125      2.8453        16
 DEPSIZE            66  CUMNOCK                           8.4565      3.4170        46
 DEPSIZE           146  PAISLEY                           9.8182      3.3589        77
 DEPSIZE           177  HAMILTON                          9.8540      3.1913       137
 DEPSIZE           180  WISHAW                            9.5000      3.3661        66
 DEPSIZE           235  EDINBURGH                         9.4878      3.2794       164
O  TOTAL CASES =        613
 MISSING CASES =         23 OR    3.8 PCT.
-
 22 APR 88 SBG BUS DRIVER STUDY                                                   PAGE  22
 11:59:06  **E.R.C.C. EMAS-A AMDAHL V7**  AMDAHL V7 000001 EMAS-3 (VSS)

0- - - -  D E S C R I P T I O N   O F   S U B P O P U L A T I O N S  - - - - -

 CRITERION VARIABLE   SPFQ2
     BROKEN DOWN BY   DEPSIZE

 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
OVARIABLE        VALUE  LABEL                              MEAN      STD DEV     CASES
OFOR ENTIRE POPULATION                                   11.2763      3.6827       590

 DEPSIZE            11  FRASERBURGH                       9.8750      2.9970         8
 DEPSIZE            13  FORRES                           13.0000      5.2536         6
 DEPSIZE            20  HAWICK                           10.2857      3.4065        14
 DEPSIZE            23  FORT WILLIAM                     11.7692      2.3859        13
 DEPSIZE            39  PETERHEAD                        11.3684      3.0950        19
 DEPSIZE            40  ALLOA                            10.7500      3.5294        24
 DEPSIZE            42  ELGIN                            11.4375      3.0977        16
 DEPSIZE            66  CUMNOCK                          10.6957      3.6078        46
 DEPSIZE           146  PAISLEY                          11.2078      4.2032        77
 DEPSIZE           177  HAMILTON                         11.2409      3.5283       137
 DEPSIZE           180  WISHAW                           11.4242      4.0309        66
 DEPSIZE           235  EDINBURGH                        11.5427      3.6744       164
O  TOTAL CASES =        613
 MISSING CASES =         23 OR    3.8 PCT.
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22 APR 88 SBG BUS DRIVER STUDY                                                    PAGE  23
11:59:06  **E.R.C.C. EMAS-A AMDAHL V7**  AMDAHL V7 000001 EMAS-3 (VSS)

0- - - -   D E S C R I P T I O N   O F   S U B P O P U L A T I O N S   - - - - -

 CRITERION VARIABLE   SPFQ3
     BROKEN DOWN BY   DEPSIZE

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
0VARIABLE      VALUE  LABEL                          MEAN      STD DEV     CASES
0FOR ENTIRE POPULATION                            12.7847      3.2459       590

 DEPSIZE          11  FRASERBURGH                 12.7500      2.9155         8
 DEPSIZE          13  FORRES                      12.6667      3.1411         6
 DEPSIZE          20  HAWICK                      11.5714      3.3904        14
 DEPSIZE          23  FORT WILLIAM                12.6923      3.1194        13
 DEPSIZE          39  PETERHEAD                   13.1579      2.6302        19
 DEPSIZE          40  ALLOA                       13.6250      2.8255        24
 DEPSIZE          42  ELGIN                       12.4375      2.9205        16
 DEPSIZE          66  CUMNOCK                     12.9348      3.5864        46
 DEPSIZE         146  PAISLEY                     13.1948      3.1956        77
 DEPSIZE         177  HAMILTON                    12.6350      3.2333       137
 DEPSIZE         180  WISHAW                      12.5455      3.4693        66
 DEPSIZE         235  EDINBURGH                   12.7561      3.2974       164
0  TOTAL CASES =       613
 MISSING CASES =        23 OR    3.8 PCT.
-
 22 APR 88 SBG BUS DRIVER STUDY                                                   PAGE  24
 11:59:06  **E.R.C.C. EMAS-A AMDAHL V7**  AMDAHL V7 000001 EMAS-3 (VSS)

0- - - -   D E S C R I P T I O N   O F   S U B P O P U L A T I O N S   - - - - -

 CRITERION VARIABLE   SPFQ4
     BROKEN DOWN BY   DEPSIZE

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
0VARIABLE      VALUE  LABEL                          MEAN      STD DEV     CASES
0FOR ENTIRE POPULATION                            12.4254      4.7092       590

 DEPSIZE          11  FRASERBURGH                 12.8750      5.2491         8
 DEPSIZE          13  FORRES                      15.0000      2.0976         6
 DEPSIZE          20  HAWICK                      13.2857      3.5394        14
 DEPSIZE          23  FORT WILLIAM                13.5385      5.0102        13
 DEPSIZE          39  PETERHEAD                   13.5263      2.8938        19
 DEPSIZE          40  ALLOA                       12.7500      4.6086        24
 DEPSIZE          42  ELGIN                       13.4375      4.1468        16
 DEPSIZE          66  CUMNOCK                     12.1739      5.3388        46
 DEPSIZE         146  PAISLEY                     11.7403      4.6915        77
 DEPSIZE         177  HAMILTON                    12.1460      4.6218       137
 DEPSIZE         180  WISHAW                      12.9697      5.0045        66
 DEPSIZE         235  EDINBURGH                   12.2805      4.8379       164
0  TOTAL CASES =       613
 MISSING CASES =        23 OR    3.8 PCT.
```

Appendix B9: Biographical data by depot

22 APR 88 SBG BUS DRIVER STUDY PAGE 2
12:03:38 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE AGE CURRENT AGE
BROKEN DOWN BY DEPSIZE

0VARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
0FOR ENTIRE POPULATION			39.8256	10.5010	602
DEPSIZE	11	FRASERBURGH	51.0000	7.4685	10
DEPSIZE	13	FORRES	37.8333	7.5741	6
DEPSIZE	20	HAWICK	45.5714	14.4792	14
DEPSIZE	23	FORT WILLIAM	44.9286	8.3248	14
DEPSIZE	39	PETERHEAD	45.7083	11.7120	24
DEPSIZE	40	ALLOA	39.0417	8.1852	24
DEPSIZE	42	ELGIN	42.4375	9.5497	16
DEPSIZE	66	CUMNOCK	43.0444	8.6207	45
DEPSIZE	146	PAISLEY	38.4250	11.1193	80
DEPSIZE	177	HAMILTON	38.2681	9.8229	138
DEPSIZE	180	WISHAW	37.9701	9.4756	67
DEPSIZE	235	EDINBURGH	39.1585	10.8802	164

0 TOTAL CASES = 613
MISSING CASES = 11 OR 1.8 PCT.

22 APR 88 SBG BUS DRIVER STUDY PAGE 3
12:03:40 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE SERVICE NUMBER OF YEARS EMPLOYED
BROKEN DOWN BY DEPSIZE

0VARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
0FOR ENTIRE POPULATION			7.3421	7.0579	608
DEPSIZE	11	FRASERBURGH	13.9091	8.0182	11
DEPSIZE	13	FORRES	1.6667	.5164	6
DEPSIZE	20	HAWICK	12.5714	11.8043	14
DEPSIZE	23	FORT WILLIAM	7.4667	4.5961	15
DEPSIZE	39	PETERHEAD	8.1667	8.8203	24
DEPSIZE	40	ALLOA	7.1364	5.9546	22
DEPSIZE	42	ELGIN	7.7647	6.4375	17
DEPSIZE	66	CUMNOCK	12.1957	6.8007	46
DEPSIZE	146	PAISLEY	4.6000	5.3263	80
DEPSIZE	177	HAMILTON	6.8551	4.8684	138
DEPSIZE	180	WISHAW	7.0597	5.1224	67
DEPSIZE	235	EDINBURGH	7.0238	8.5387	168

0 TOTAL CASES = 613
MISSING CASES = 5 OR 0.8 PCT.

22 APR 88 SBG BUS DRIVER STUDY PAGE 4
12:03:42 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE JOINAGE AGE ON JOINING
BROKEN DOWN BY DEPSIZE

0VARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
0FOR ENTIRE POPULATION			32.4908	8.7444	599
DEPSIZE	11	FRASERBURGH	36.3000	8.7312	10
DEPSIZE	13	FORRES	36.1667	7.8592	6
DEPSIZE	20	HAWICK	33.0000	8.5575	14
DEPSIZE	23	FORT WILLIAM	37.7143	9.0505	14
DEPSIZE	39	PETERHEAD	37.5417	9.0216	24
DEPSIZE	40	ALLOA	32.1364	9.3620	22
DEPSIZE	42	ELGIN	34.6250	9.5350	16
DEPSIZE	66	CUMNOCK	30.5778	6.9625	45
DEPSIZE	146	PAISLEY	33.8250	9.8286	80
DEPSIZE	177	HAMILTON	31.4130	8.7293	138
DEPSIZE	180	WISHAW	30.9104	8.2952	67
DEPSIZE	235	EDINBURGH	32.1595	8.2177	163

0 TOTAL CASES = 613
MISSING CASES = 14 OR 2.3 PCT.

Appendix B10: Background data by depot (contd)
Performance data by depot

22 APR 88 SBG BUS DRIVER STUDY PAGE 5
12:03:42 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE CARLIC NUMBER OF YEARS CAR LICENCE HELD PRIOR T
BROKEN DOWN BY DEPSIZE

OVARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
OFOR ENTIRE POPULATION			12.0598	8.2813	368
DEPSIZE	11	FRASERBURGH	17.8333	11.3387	6
DEPSIZE	13	FORRES	13.0000	8.3666	6
DEPSIZE	20	HAWICK	16.1250	8.7250	8
DEPSIZE	23	FORT WILLIAM	19.6667	7.4666	9
DEPSIZE	39	PETERHEAD	18.0000	5.6569	2
DEPSIZE	40	ALLOA	14.3158	7.8248	19
DEPSIZE	42	ELGIN	18.1000	7.5048	10
DEPSIZE	66	CUMNOCK	10.3000	8.2199	10
DEPSIZE	146	PAISLEY	13.5192	9.0196	52
DEPSIZE	177	HAMILTON	10.0548	7.6247	73
DEPSIZE	180	WISHAW	10.1538	6.8192	39
DEPSIZE	235	EDINBURGH	11.3582	8.1401	134

0 TOTAL CASES = 613
MISSING CASES = 245 OR 40.0 PCT.

22 APR 88 SBG BUS DRIVER STUDY PAGE 6
12:03:42 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE PREVJOBS NUMBER OF JOBS IN FIVE YEARS PRIOR TO JO
BROKEN DOWN BY DEPSIZE

OVARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
OFOR ENTIRE POPULATION			2.2920	1.1697	411
DEPSIZE	11	FRASERBURGH	2.0000	.8944	6
DEPSIZE	13	FORRES	2.0000	.6325	6
DEPSIZE	20	HAWICK	3.1111	1.0541	9
DEPSIZE	23	FORT WILLIAM	2.1667	1.5859	12
DEPSIZE	39	PETERHEAD	2.1667	1.1690	6
DEPSIZE	40	ALLOA	2.3684	1.0116	19
DEPSIZE	42	ELGIN	2.0625	.9287	16
DEPSIZE	66	CUMNOCK	2.2500	1.1255	16
DEPSIZE	146	PAISLEY	2.0769	1.0819	52
DEPSIZE	177	HAMILTON	2.2714	1.1662	70
DEPSIZE	180	WISHAW	2.3333	1.1773	39
DEPSIZE	235	EDINBURGH	2.3687	1.2369	160

0 TOTAL CASES = 613
MISSING CASES = 202 OR 33.0 PCT.

22 APR 88 SBG BUS DRIVER STUDY PAGE 7
12:03:44 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE AD1 TIMEKEEPING
BROKEN DOWN BY DEPSIZE

OVARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
OFOR ENTIRE POPULATION			.2466	.4754	594
DEPSIZE	11	FRASERBURGH	.0111	.0368	11
DEPSIZE	13	FORRES	.4254	.3993	6
DEPSIZE	20	HAWICK	.2169	.2585	14
DEPSIZE	23	FORT WILLIAM	.0676	.1160	15
DEPSIZE	39	PETERHEAD	.0764	.1661	22
DEPSIZE	40	ALLOA	.1605	.2221	21
DEPSIZE	42	ELGIN	.0000	.0000	17
DEPSIZE	66	CUMNOCK	.0343	.0896	46
DEPSIZE	146	PAISLEY	.1748	.6010	79
DEPSIZE	177	HAMILTON	.1821	.4178	133
DEPSIZE	180	WISHAW	.6011	.5996	65
DEPSIZE	235	EDINBURGH	.3394	.4956	165

0 TOTAL CASES = 613
MISSING CASES = 19 OR 3.1 PCT.

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22 APR 88 SBG BUS DRIVER STUDY                                              PAGE   8
12:03:44  **E.R.C.C. EMAS-A AMDAHL V7**  AMDAHL V7 000001 EMAS-3 (VSS)

0- - - -  D E S C R I P T I O N   O F   S U B P O P U L A T I O N S  - - - - -

 CRITERION VARIABLE   AD2        TICKET ISSUE
     BROKEN DOWN BY   DEPSIZE
```

VARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
FOR ENTIRE POPULATION			.4154	.6816	594
DEPSIZE	11	FRASERBURGH	.0776	.0987	11
DEPSIZE	13	FORRES	.1173	.1821	6
DEPSIZE	20	HAWICK	.9731	.5861	14
DEPSIZE	23	FORT WILLIAM	.1112	.1639	15
DEPSIZE	39	PETERHEAD	.2278	.3101	22
DEPSIZE	40	ALLOA	.2436	.2873	21
DEPSIZE	42	ELGIN	.1493	.1868	17
DEPSIZE	66	CUMNOCK	.0286	.0997	46
DEPSIZE	146	PAISLEY	.1372	.6115	79
DEPSIZE	177	HAMILTON	.1477	.3516	133
DEPSIZE	180	WISHAW	.2356	.3725	65
DEPSIZE	235	EDINBURGH	1.0309	.8340	165

```
0  TOTAL CASES =      613
 MISSING CASES =       19 OR    3.1 PCT.
```

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22 APR 88 SBG BUS DRIVER STUDY                                              PAGE   9
12:03:44  **E.R.C.C. EMAS-A AMDAHL V7**  AMDAHL V7 000001 EMAS-3 (VSS)

0- - - -  D E S C R I P T I O N   O F   S U B P O P U L A T I O N S  - - - - -

 CRITERION VARIABLE   AD3        FAILURE TO STOP
     BROKEN DOWN BY   DEPSIZE
```

VARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
FOR ENTIRE POPULATION			.1381	.3486	594
DEPSIZE	11	FRASERBURGH	.0340	.0798	11
DEPSIZE	13	FORRES	.0000	.0000	6
DEPSIZE	20	HAWICK	.1010	.1698	14
DEPSIZE	23	FORT WILLIAM	.0000	.0000	15
DEPSIZE	39	PETERHEAD	.0512	.1391	22
DEPSIZE	40	ALLOA	.0611	.1244	21
DEPSIZE	42	ELGIN	.0163	.0674	17
DEPSIZE	66	CUMNOCK	.0000	.0000	46
DEPSIZE	146	PAISLEY	.0764	.5638	79
DEPSIZE	177	HAMILTON	.0785	.2498	133
DEPSIZE	180	WISHAW	.2316	.3625	65
DEPSIZE	235	EDINBURGH	.2789	.3731	165

```
0  TOTAL CASES =      613
 MISSING CASES =       19 OR    3.1 PCT.
```

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22 APR 88 SBG BUS DRIVER STUDY                                              PAGE  10
12:03:44  **E.R.C.C. EMAS-A AMDAHL V7**  AMDAHL V7 000001 EMAS-3 (VSS)

0- - - -  D E S C R I P T I O N   O F   S U B P O P U L A T I O N S  - - - - -

 CRITERION VARIABLE   AD4        RUDENESS
     BROKEN DOWN BY   DEPSIZE
```

VARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
FOR ENTIRE POPULATION			.0575	.1985	594
DEPSIZE	11	FRASERBURGH	.0000	.0000	11
DEPSIZE	13	FORRES	.0000	.0000	6
DEPSIZE	20	HAWICK	.0397	.1485	14
DEPSIZE	23	FORT WILLIAM	.0084	.0327	15
DEPSIZE	39	PETERHEAD	.0000	.0000	22
DEPSIZE	40	ALLOA	.0273	.0702	21
DEPSIZE	42	ELGIN	.0557	.1188	17
DEPSIZE	66	CUMNOCK	.0000	.0000	46
DEPSIZE	146	PAISLEY	.0306	.2271	79
DEPSIZE	177	HAMILTON	.0119	.0704	133
DEPSIZE	180	WISHAW	.0867	.2562	65
DEPSIZE	235	EDINBURGH	.1353	.2720	165

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0  TOTAL CASES =      613
 MISSING CASES =       19 OR    3.1 PCT.
```

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22 APR 88 SBG BUS DRIVER STUDY PAGE 11
12:03:44 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE AD5 CARELESSNESS
BROKEN DOWN BY DEPSIZE

VARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
FOR ENTIRE POPULATION			.2093	.3643	594
DEPSIZE	11	FRASERBURGH	.0802	.1140	11
DEPSIZE	13	FORRES	.3519	.5462	6
DEPSIZE	20	HAWICK	.4008	.5776	14
DEPSIZE	23	FORT WILLIAM	.1073	.1627	15
DEPSIZE	39	PETERHEAD	.1750	.2458	22
DEPSIZE	40	ALLOA	.3468	.3893	21
DEPSIZE	42	ELGIN	.1814	.2358	17
DEPSIZE	66	CUMNOCK	.0343	.1054	46
DEPSIZE	146	PAISLEY	.1080	.2690	79
DEPSIZE	177	HAMILTON	.0954	.2618	133
DEPSIZE	180	WISHAW	.3377	.4644	65
DEPSIZE	235	EDINBURGH	.3342	.4220	165

0 TOTAL CASES = 613
MISSING CASES = 19 OR 3.1 PCT.

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22 APR 88 SBG BUS DRIVER STUDY PAGE 12
12:03:46 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE AD6 QUALITY OF DRIVING
BROKEN DOWN BY DEPSIZE

VARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
FOR ENTIRE POPULATION			.0293	.1259	594
DEPSIZE	11	FRASERBURGH	.0779	.2584	11
DEPSIZE	13	FORRES	.0000	.0000	6
DEPSIZE	20	HAWICK	.0397	.1485	14
DEPSIZE	23	FORT WILLIAM	.0000	.0000	15
DEPSIZE	39	PETERHEAD	.0067	.0314	22
DEPSIZE	40	ALLOA	.0268	.0698	21
DEPSIZE	42	ELGIN	.0149	.0421	17
DEPSIZE	66	CUMNOCK	.0000	.0000	46
DEPSIZE	146	PAISLEY	.0073	.0489	79
DEPSIZE	177	HAMILTON	.0251	.1384	133
DEPSIZE	180	WISHAW	.0385	.1115	65
DEPSIZE	235	EDINBURGH	.0521	.1666	165

0 TOTAL CASES = 613
MISSING CASES = 19 OR 3.1 PCT.

-

22 APR 88 SBG BUS DRIVER STUDY PAGE 13
12:03:48 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE AD7 XS ABSENTEEISM
BROKEN DOWN BY DEPSIZE

VARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
FOR ENTIRE POPULATION			.0841	.2583	594
DEPSIZE	11	FRASERBURGH	.0000	.0000	11
DEPSIZE	13	FORRES	.0000	.0000	6
DEPSIZE	20	HAWICK	.0714	.1608	14
DEPSIZE	23	FORT WILLIAM	.0253	.0524	15
DEPSIZE	39	PETERHEAD	.0000	.0000	22
DEPSIZE	40	ALLOA	.1221	.2227	21
DEPSIZE	42	ELGIN	.0000	.0000	17
DEPSIZE	66	CUMNOCK	.0172	.1164	46
DEPSIZE	146	PAISLEY	.1149	.2836	79
DEPSIZE	177	HAMILTON	.0075	.0611	133
DEPSIZE	180	WISHAW	.3478	.5366	65
DEPSIZE	235	EDINBURGH	.0759	.1962	165

0 TOTAL CASES = 613
MISSING CASES = 19 OR 3.1 PCT.

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22 APR 88 SBG BUS DRIVER STUDY PAGE 14
12:03:48 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE AD8 XS CASH SHORTS
BROKEN DOWN BY DEPSIZE

OVARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
OFOR ENTIRE POPULATION			.2751	.7272	594
DEPSIZE	11	FRASERBURGH	.0000	.0000	11
DEPSIZE	13	FORRES	.0000	.0000	6
DEPSIZE	20	HAWICK	.0000	.0000	14
DEPSIZE	23	FORT WILLIAM	.0000	.0000	15
DEPSIZE	39	PETERHEAD	.0000	.0000	22
DEPSIZE	40	ALLOA	1.3902	1.0580	21
DEPSIZE	42	ELGIN	.0000	.0000	17
DEPSIZE	66	CUMNOCK	.0000	.0000	46
DEPSIZE	146	PAISLEY	.1906	.4002	79
DEPSIZE	177	HAMILTON	.3116	.6773	133
DEPSIZE	180	WISHAW	1.1588	1.3600	65
DEPSIZE	235	EDINBURGH	.0146	.0802	165

0 TOTAL CASES = 613
MISSING CASES = 19 OR 3.1 PCT.

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22 APR 88 SBG BUS DRIVER STUDY PAGE 15
12:03:48 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE AD9 MISCELLANEOUS
BROKEN DOWN BY DEPSIZE

OVARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
OFOR ENTIRE POPULATION			.0118	.0771	594
DEPSIZE	11	FRASERBURGH	.0000	.0000	11
DEPSIZE	13	FORRES	.0000	.0000	6
DEPSIZE	20	HAWICK	.0159	.0594	14
DEPSIZE	23	FORT WILLIAM	.0000	.0000	15
DEPSIZE	39	PETERHEAD	.0000	.0000	22
DEPSIZE	40	ALLOA	.0131	.0415	21
DEPSIZE	42	ELGIN	.0000	.0000	17
DEPSIZE	66	CUMNOCK	.0000	.0000	46
DEPSIZE	146	PAISLEY	.0199	.1261	79
DEPSIZE	177	HAMILTON	.0111	.0734	133
DEPSIZE	180	WISHAW	.0227	.0943	65
DEPSIZE	235	EDINBURGH	.0120	.0739	165

0 TOTAL CASES = 613
MISSING CASES = 19 OR 3.1 PCT.

-

22 APR 88 SBG BUS DRIVER STUDY PAGE 16
12:03:48 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE ACOMP COMPLAINTS
BROKEN DOWN BY DEPSIZE

OVARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
OFOR ENTIRE POPULATION			.1156	.2973	594
DEPSIZE	11	FRASERBURGH	.0000	.0000	11
DEPSIZE	13	FORRES	.0617	.1512	6
DEPSIZE	20	HAWICK	.0650	.1940	14
DEPSIZE	23	FORT WILLIAM	.0000	.0000	15
DEPSIZE	39	PETERHEAD	.0608	.1430	22
DEPSIZE	40	ALLOA	.0749	.1700	21
DEPSIZE	42	ELGIN	.0470	.1158	17
DEPSIZE	66	CUMNOCK	.0000	.0000	46
DEPSIZE	146	PAISLEY	.0912	.3795	79
DEPSIZE	177	HAMILTON	.0586	.1995	133
DEPSIZE	180	WISHAW	.0920	.2024	65
DEPSIZE	235	EDINBURGH	.2586	.4011	165

0 TOTAL CASES = 613
MISSING CASES = 19 OR 3.1 PCT.

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE ACOMM COMMENDATIONS
BROKEN DOWN BY DEPSIZE

VARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
FOR ENTIRE POPULATION			.0518	.2388	594
DEPSIZE	11	FRASERBURGH	.0000	.0000	11
DEPSIZE	13	FORRES	.0000	.0000	6
DEPSIZE	20	HAWICK	.0000	.0000	14
DEPSIZE	23	FORT WILLIAM	.0083	.0323	15
DEPSIZE	39	PETERHEAD	.0000	.0000	22
DEPSIZE	40	ALLOA	.0000	.0000	21
DEPSIZE	42	ELGIN	.0000	.0000	17
DEPSIZE	66	CUMNOCK	.0031	.0211	46
DEPSIZE	146	PAISLEY	.0216	.1633	79
DEPSIZE	177	HAMILTON	.0038	.0434	133
DEPSIZE	180	WISHAW	.0077	.0620	65
DEPSIZE	235	EDINBURGH	.1684	.4138	165

0 TOTAL CASES = 613
MISSING CASES = 19 OR 3.1 PCT.

22 APR 88 SBG BUS DRIVER STUDY PAGE 18
12:03:48 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE AVTOTDIS AVERAGE TOTAL DISCIPLINERY OFFENCES
BROKEN DOWN BY DEPSIZE

VARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
FOR ENTIRE POPULATION			1.4671	1.7459	594
DEPSIZE	11	FRASERBURGH	.2808	.3372	11
DEPSIZE	13	FORRES	.8945	.8302	6
DEPSIZE	20	HAWICK	1.8586	1.1324	14
DEPSIZE	23	FORT WILLIAM	.3199	.2332	15
DEPSIZE	39	PETERHEAD	.5371	.6272	22
DEPSIZE	40	ALLOA	2.3915	1.4826	21
DEPSIZE	42	ELGIN	.4177	.4230	17
DEPSIZE	66	CUMNOCK	.1144	.2864	46
DEPSIZE	146	PAISLEY	.8598	1.4236	79
DEPSIZE	177	HAMILTON	.8709	1.3070	133
DEPSIZE	180	WISHAW	3.0606	2.5197	65
DEPSIZE	235	EDINBURGH	2.2732	1.5793	165

0 TOTAL CASES = 613
MISSING CASES = 19 OR 3.1 PCT.

22 APR 88 SBG BUS DRIVER STUDY PAGE 19
12:03:48 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE AVLATE AVERAGE DAYS LATE FOR WORK PER YEAR
BROKEN DOWN BY DEPSIZE

VARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
FOR ENTIRE POPULATION			1.1959	1.7255	389
DEPSIZE	20	HAWICK	.0571	.1222	14
DEPSIZE	42	ELGIN	.2562	.2780	16
DEPSIZE	146	PAISLEY	9.9000	.0000	1
DEPSIZE	177	HAMILTON	.7080	.9864	137
DEPSIZE	180	WISHAW	1.2692	1.5858	65
DEPSIZE	235	EDINBURGH	1.7365	2.0852	156

0 TOTAL CASES = 613
MISSING CASES = 224 OR 36.5 PCT.

22 APR 88 SBG BUS DRIVER STUDY PAGE 20
12:03:48 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE AVABS AVERAGE DAYS ABSENCE PER YEAR
BROKEN DOWN BY DEPSIZE

VARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
FOR ENTIRE POPULATION			2.4460	2.9552	372
DEPSIZE	20	HAWICK	.0000	.0000	14
DEPSIZE	177	HAMILTON	3.4672	3.6077	137
DEPSIZE	180	WISHAW	2.4585	2.7351	65
DEPSIZE	235	EDINBURGH	1.7635	2.1128	156

0 TOTAL CASES = 613
MISSING CASES = 241 OR 39.3 PCT.

22 APR 88 SBG BUS DRIVER STUDY PAGE 21
12:03:48 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE SHORTS NUMBER OF WEEKS CASH SHORTAGE REPORTED P
BROKEN DOWN BY DEPSIZE

0VARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
0FOR ENTIRE POPULATION			20.7472	14.3927	451
DEPSIZE	11	FRASERBURGH	18.2727	12.1003	11
DEPSIZE	13	FORRES	22.5333	10.2252	6
DEPSIZE	39	PETERHEAD	33.5000	10.4003	22
DEPSIZE	42	ELGIN	33.8000	10.9076	16
DEPSIZE	66	CUMNOCK	10.2386	8.5521	44
DEPSIZE	177	HAMILTON	30.9706	11.5624	136
DEPSIZE	180	WISHAW	25.2833	10.4995	60
DEPSIZE	235	EDINBURGH	10.0224	9.7835	156

0 TOTAL CASES = 613
MISSING CASES = 162 OR 26.4 PCT.

22 APR 88 SBG BUS DRIVER STUDY PAGE 22
12:03:48 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE AAD2 INTERVIEW/INSTRUCTION
BROKEN DOWN BY DEPSIZE

0VARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
0FOR ENTIRE POPULATION			.2955	.6449	594
DEPSIZE	11	FRASERBURGH	.0222	.0493	11
DEPSIZE	13	FORRES	.0000	.0000	6
DEPSIZE	20	HAWICK	.0140	.0524	14
DEPSIZE	23	FORT WILLIAM	.0568	.1619	15
DEPSIZE	39	PETERHEAD	.1427	.2284	22
DEPSIZE	40	ALLOA	.1339	.2843	21
DEPSIZE	42	ELGIN	.0706	.1665	17
DEPSIZE	66	CUMNOCK	.0114	.0543	46
DEPSIZE	146	PAISLEY	.0269	.2253	79
DEPSIZE	177	HAMILTON	.0107	.0667	133
DEPSIZE	180	WISHAW	.0000	.0000	65
DEPSIZE	235	EDINBURGH	.9880	.8839	165

0 TOTAL CASES = 613
MISSING CASES = 19 OR 3.1 PCT.

22 APR 88 SBG BUS DRIVER STUDY PAGE 23
12:03:50 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE AAD3 WARNING
BROKEN DOWN BY DEPSIZE

0VARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
0FOR ENTIRE POPULATION			.9461	1.3317	594
DEPSIZE	11	FRASERBURGH	.1142	.1860	11
DEPSIZE	13	FORRES	.7279	.5296	6
DEPSIZE	20	HAWICK	1.8064	1.0478	14
DEPSIZE	23	FORT WILLIAM	.1697	.1874	15
DEPSIZE	39	PETERHEAD	.3559	.4424	22
DEPSIZE	40	ALLOA	2.1211	1.3947	21
DEPSIZE	42	ELGIN	.2994	.3481	17
DEPSIZE	66	CUMNOCK	.0400	.0956	46
DEPSIZE	146	PAISLEY	.4299	.7358	79
DEPSIZE	177	HAMILTON	.8748	1.3688	133
DEPSIZE	180	WISHAW	2.7751	2.0244	65
DEPSIZE	235	EDINBURGH	.8394	.7325	165

0 TOTAL CASES = 613
MISSING CASES = 19 OR 3.1 PCT.

22 APR 88 SBG BUS DRIVER STUDY PAGE 24
12:03:50 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE AAD4 WRITTEN WARNING
BROKEN DOWN BY DEPSIZE

OVARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
OFOR ENTIRE POPULATION			.1035	.3070	594
DEPSIZE	11	FRASERBURGH	.0333	.0570	11
DEPSIZE	13	FORRES	.0556	.1361	6
DEPSIZE	20	HAWICK	.0317	.1188	14
DEPSIZE	23	FORT WILLIAM	.0508	.0809	15
DEPSIZE	39	PETERHEAD	.0000	.0000	22
DEPSIZE	40	ALLOA	.0000	.0000	21
DEPSIZE	42	ELGIN	.0322	.0795	17
DEPSIZE	66	CUMNOCK	.0114	.0776	46
DEPSIZE	146	PAISLEY	.1656	.6072	79
DEPSIZE	177	HAMILTON	.0095	.0793	133
DEPSIZE	180	WISHAW	.2057	.3901	65
DEPSIZE	235	EDINBURGH	.1867	.2633	165

0 TOTAL CASES = 613
MISSING CASES = 19 OR 3.1 PCT.

22 APR 88 SBG BUS DRIVER STUDY PAGE 25
12:03:50 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE AAD5 FINAL WARNING
BROKEN DOWN BY DEPSIZE

OVARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
OFOR ENTIRE POPULATION			.0277	.1427	594
DEPSIZE	11	FRASERBURGH	.0111	.0368	11
DEPSIZE	13	FORRES	.0556	.1361	6
DEPSIZE	20	HAWICK	.0000	.0000	14
DEPSIZE	23	FORT WILLIAM	.0000	.0000	15
DEPSIZE	39	PETERHEAD	.0067	.0314	22
DEPSIZE	40	ALLOA	.0151	.0693	21
DEPSIZE	42	ELGIN	.0000	.0000	17
DEPSIZE	66	CUMNOCK	.0114	.0776	46
DEPSIZE	146	PAISLEY	.0586	.1770	79
DEPSIZE	177	HAMILTON	.0085	.0691	133
DEPSIZE	180	WISHAW	.0905	.3250	65
DEPSIZE	235	EDINBURGH	.0205	.0886	165

0 TOTAL CASES = 613
MISSING CASES = 19 OR 3.1 PCT.

22 APR 88 SBG BUS DRIVER STUDY PAGE 26
12:03:50 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE AAD6 SUSPENSIONS
BROKEN DOWN BY DEPSIZE

OVARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
OFOR ENTIRE POPULATION			.0978	.2574	594
DEPSIZE	11	FRASERBURGH	.0222	.0493	11
DEPSIZE	13	FORRES	.1111	.2722	6
DEPSIZE	20	HAWICK	.0317	.0807	14
DEPSIZE	23	FORT WILLIAM	.0260	.0733	15
DEPSIZE	39	PETERHEAD	.0263	.0972	22
DEPSIZE	40	ALLOA	.0951	.1372	21
DEPSIZE	42	ELGIN	.0077	.0319	17
DEPSIZE	66	CUMNOCK	.0458	.1692	46
DEPSIZE	146	PAISLEY	.0829	.1990	79
DEPSIZE	177	HAMILTON	.0047	.0542	133
DEPSIZE	180	WISHAW	.1256	.3287	65
DEPSIZE	235	EDINBURGH	.2194	.3682	165

0 TOTAL CASES = 613
MISSING CASES = 19 OR 3.1 PCT.

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22 APR 88 SBG BUS DRIVER STUDY PAGE 27
12:03:50 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE AAD7 DISM THEN REINSTATED
BROKEN DOWN BY DEPSIZE

OVARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
OFOR ENTIRE POPULATION			.0183	.2174	594
DEPSIZE	11	FRASERBURGH	.0111	.0368	11
DEPSIZE	13	FORRES	.0000	.0000	6
DEPSIZE	20	HAWICK	.0000	.0000	14
DEPSIZE	23	FORT WILLIAM	.0000	.0000	15
DEPSIZE	39	PETERHEAD	.0189	.0888	22
DEPSIZE	40	ALLOA	.0212	.0536	21
DEPSIZE	42	ELGIN	.0000	.0000	17
DEPSIZE	66	CUMNOCK	.0172	.1164	46
DEPSIZE	146	PAISLEY	.0853	.5680	79
DEPSIZE	177	HAMILTON	.0038	.0434	133
DEPSIZE	180	WISHAW	.0162	.1306	65
DEPSIZE	235	EDINBURGH	.0049	.0382	165

0 TOTAL CASES = 613
MISSING CASES = 19 OR 3.1 PCT.

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22 APR 88 SBG BUS DRIVER STUDY PAGE 28
12:03:50 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE AA01 COLLISION WITH VEHICLES
BROKEN DOWN BY DEPSIZE

OVARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
OFOR ENTIRE POPULATION			.8833	1.0261	604
DEPSIZE	11	FRASERBURGH	.4697	.2553	11
DEPSIZE	13	FORRES	.6729	.5731	6
DEPSIZE	20	HAWICK	.3311	.4170	14
DEPSIZE	23	FORT WILLIAM	.7598	1.0683	15
DEPSIZE	39	PETERHEAD	.9221	.5837	22
DEPSIZE	40	ALLOA	.8003	.5671	21
DEPSIZE	42	ELGIN	.6022	.4698	17
DEPSIZE	66	CUMNOCK	.7147	.7829	46
DEPSIZE	146	PAISLEY	1.1602	1.8020	80
DEPSIZE	177	HAMILTON	.7221	.8315	137
DEPSIZE	180	WISHAW	.5288	.6235	67
DEPSIZE	235	EDINBURGH	1.1960	.9460	168

0 TOTAL CASES = 613
MISSING CASES = 9 OR 1.5 PCT.

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22 APR 88 SBG BUS DRIVER STUDY PAGE 29
12:03:52 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE AA02 COLLISION WITH PEDESTRIANS
BROKEN DOWN BY DEPSIZE

OVARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
OFOR ENTIRE POPULATION			.0338	.1528	604
DEPSIZE	11	FRASERBURGH	.0229	.0510	11
DEPSIZE	13	FORRES	.0000	.0000	6
DEPSIZE	20	HAWICK	.0000	.0000	14
DEPSIZE	23	FORT WILLIAM	.0392	.1519	15
DEPSIZE	39	PETERHEAD	.0066	.0309	22
DEPSIZE	40	ALLOA	.0137	.0434	21
DEPSIZE	42	ELGIN	.0264	.0610	17
DEPSIZE	66	CUMNOCK	.0114	.0543	46
DEPSIZE	146	PAISLEY	.0166	.0886	80
DEPSIZE	177	HAMILTON	.0447	.1573	137
DEPSIZE	180	WISHAW	.0522	.1541	67
DEPSIZE	235	EDINBURGH	.0431	.2158	168

0 TOTAL CASES = 613
MISSING CASES = 9 OR 1.5 PCT.

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22 APR 88 SBG BUS DRIVER STUDY PAGE 30
12:03:52 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE AA03 COLLISION WITH ANIMALS
BROKEN DOWN BY DEPSIZE

OVARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
OFOR ENTIRE POPULATION			.0276	.1870	604
DEPSIZE	11	FRASERBURGH	.0000	.0000	11
DEPSIZE	13	FORRES	.0758	.1856	6
DEPSIZE	20	HAWICK	.0000	.0000	14
DEPSIZE	23	FORT WILLIAM	.0083	.0323	15
DEPSIZE	39	PÉTERHEAD	.0111	.0359	22
DEPSIZE	40	ALLOA	.0246	.0618	21
DEPSIZE	42	ELGIN	.0072	.0296	17
DEPSIZE	66	CUMNOCK	.0114	.0543	46
DEPSIZE	146	PAISLEY	.0812	.4637	80
DEPSIZE	177	HAMILTON	.0219	.1027	137
DEPSIZE	180	WISHAW	.0373	.1324	67
DEPSIZE	235	EDINBURGH	.0159	.0667	168

0 TOTAL CASES = 613
MISSING CASES = 9 OR 1.5 PCT.

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22 APR 88 SBG BUS DRIVER STUDY PAGE 31
12:03:52 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE AA04 COLLISION WITH INANIMATE OBJECTS
BROKEN DOWN BY DEPSIZE

OVARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
OFOR ENTIRE POPULATION			.2643	.4488	604
DEPSIZE	11	FRASERBURGH	.1594	.0946	11
DEPSIZE	13	FORRES	.6898	.6430	6
DEPSIZE	20	HAWICK	.1320	.1925	14
DEPSIZE	23	FORT WILLIAM	.3095	.2652	15
DEPSIZE	39	PETERHEAD	.4480	.5991	22
DEPSIZE	40	ALLOA	.2752	.4134	21
DEPSIZE	42	ELGIN	.1997	.2667	17
DEPSIZE	66	CUMNOCK	.0686	.1407	46
DEPSIZE	146	PAISLEY	.3582	.7517	80
DEPSIZE	177	HAMILTON	.2284	.4081	137
DEPSIZE	180	WISHAW	.2277	.3857	67
DEPSIZE	235	EDINBURGH	.2970	.3674	168

0 TOTAL CASES = 613
MISSING CASES = 9 OR 1.5 PCT.

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22 APR 88 SBG BUS DRIVER STUDY PAGE 32
12:03:52 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE AA05 BOARDING/ALIGHTING ACCIDENTS
BROKEN DOWN BY DEPSIZE

OVARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
OFOR ENTIRE POPULATION			.0467	.2213	604
DEPSIZE	11	FRASERBURGH	.0000	.0000	11
DEPSIZE	13	FORRES	.1728	.2837	6
DEPSIZE	20	HAWICK	.0000	.0000	14
DEPSIZE	23	FORT WILLIAM	.0000	.0000	15
DEPSIZE	39	PETERHEAD	.0055	.0260	22
DEPSIZE	40	ALLOA	.0200	.0640	21
DEPSIZE	42	ELGIN	.0937	.1207	17
DEPSIZE	66	CUMNOCK	.0229	.0750	46
DEPSIZE	146	PAISLEY	.2319	.5338	80
DEPSIZE	177	HAMILTON	.0182	.0941	137
DEPSIZE	180	WISHAW	.0149	.0857	67
DEPSIZE	235	EDINBURGH	.0115	.0740	168

0 TOTAL CASES = 613
MISSING CASES = 9 OR 1.5 PCT.

Appendix B19: Performance data by depot (contd)

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22 APR 88 SBG BUS DRIVER STUDY PAGE 33
12:03:52 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - DESCRIPTION OF SUBPOPULATIONS - - - - -

CRITERION VARIABLE AA06 ACCIDENTS ABOARD BUS
BROKEN DOWN BY DEPSIZE

0VARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
0FOR ENTIRE POPULATION			.1363	.3854	604
DEPSIZE	11	FRASERBURGH	.0126	.0419	11
DEPSIZE	13	FORRES	.0758	.1856	6
DEPSIZE	20	HAWICK	.0000	.0000	14
DEPSIZE	23	FORT WILLIAM	.0551	.1195	15
DEPSIZE	39	PETERHEAD	.0295	.0675	22
DEPSIZE	40	ALLOA	.0122	.0386	21
DEPSIZE	42	ELGIN	.0532	.1349	17
DEPSIZE	66	CUMNOCK	.1564	.2083	46
DEPSIZE	146	PAISLEY	.3434	.8671	80
DEPSIZE	177	HAMILTON	.0196	.0967	137
DEPSIZE	180	WISHAW	.1025	.2484	67
DEPSIZE	235	EDINBURGH	.2075	.2956	168

0 TOTAL CASES = 613
MISSING CASES = 9 OR 1.5 PCT.

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22 APR 88 SBG BUS DRIVER STUDY PAGE 34
12:03:52 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - DESCRIPTION OF SUBPOPULATIONS - - - - -

CRITERION VARIABLE AA07 VANDALISM FROM OUTSIDE
BROKEN DOWN BY DEPSIZE

0VARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
0FOR ENTIRE POPULATION			.3207	.6110	604
DEPSIZE	11	FRASERBURGH	.0000	.0000	11
DEPSIZE	13	FORRES	.0000	.0000	6
DEPSIZE	20	HAWICK	.0159	.0594	14
DEPSIZE	23	FORT WILLIAM	.0000	.0000	15
DEPSIZE	39	PETERHEAD	.0173	.0447	22
DEPSIZE	40	ALLOA	.0222	.0569	21
DEPSIZE	42	ELGIN	.0000	.0000	17
DEPSIZE	66	CUMNOCK	.0629	.1135	46
DEPSIZE	146	PAISLEY	.2528	.4430	80
DEPSIZE	177	HAMILTON	.8832	.8437	137
DEPSIZE	180	WISHAW	.5012	.7638	67
DEPSIZE	235	EDINBURGH	.0887	.1780	168

0 TOTAL CASES = 613
MISSING CASES = 9 OR 1.5 PCT.

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22 APR 88 SBG BUS DRIVER STUDY PAGE 35
12:03:52 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - DESCRIPTION OF SUBPOPULATIONS - - - - -

CRITERION VARIABLE AA08 VANDALISM INSIDE
BROKEN DOWN BY DEPSIZE

0VARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
0FOR ENTIRE POPULATION			.0393	.1743	604
DEPSIZE	11	FRASERBURGH	.0000	.0000	11
DEPSIZE	13	FORRES	.0000	.0000	6
DEPSIZE	20	HAWICK	.0000	.0000	14
DEPSIZE	23	FORT WILLIAM	.0000	.0000	15
DEPSIZE	39	PETERHEAD	.0055	.0260	22
DEPSIZE	40	ALLOA	.0122	.0560	21
DEPSIZE	42	ELGIN	.0120	.0495	17
DEPSIZE	66	CUMNOCK	.0057	.0388	46
DEPSIZE	146	PAISLEY	.0546	.1676	80
DEPSIZE	177	HAMILTON	.0520	.1848	137
DEPSIZE	180	WISHAW	.1642	.3832	67
DEPSIZE	235	EDINBURGH	.0025	.0233	168

0 TOTAL CASES = 613
MISSING CASES = 9 OR 1.5 PCT.

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Appendix B20: Performance data by depot (contd)

22 APR 88 SBG BUS DRIVER STUDY PAGE 36
12:03:54 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE AA09 MISCELLANEOUS
BROKEN DOWN BY DEPSIZE

0VARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
0FOR ENTIRE POPULATION			.0672	.1776	604
DEPSIZE	11	FRASERBURGH	.2004	.1422	11
DEPSIZE	13	FORRES	.2424	.4133	6
DEPSIZE	20	HAWICK	.0000	.0000	14
DEPSIZE	23	FORT WILLIAM	.0560	.1537	15
DEPSIZE	39	PETERHEAD	.2179	.1865	22
DEPSIZE	40	ALLOA	.0239	.0610	21
DEPSIZE	42	ELGIN	.4358	.3333	17
DEPSIZE	66	CUMNOCK	.0700	.1556	46
DEPSIZE	146	PAISLEY	.0326	.1667	80
DEPSIZE	177	HAMILTON	.0588	.1836	137
DEPSIZE	180	WISHAW	.0299	.1477	67
DEPSIZE	235	EDINBURGH	.0446	.1136	168

0 TOTAL CASES = 613
MISSING CASES = 9 OR 1.5 PCT.

22 APR 88 SBG BUS DRIVER STUDY PAGE 37
12:03:54 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE ACOL TOTAL COLLISIONS PER YEAR
BROKEN DOWN BY DEPSIZE

0VARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
0FOR ENTIRE POPULATION			1.2091	1.2023	604
DEPSIZE	11	FRASERBURGH	.6520	.2703	11
DEPSIZE	13	FORRES	1.4384	1.2443	6
DEPSIZE	20	HAWICK	.4631	.4658	14
DEPSIZE	23	FORT WILLIAM	1.1168	1.1914	15
DEPSIZE	39	PETERHEAD	1.3878	.8777	22
DEPSIZE	40	ALLOA	1.1137	.8217	21
DEPSIZE	42	ELGIN	.8355	.4994	17
DEPSIZE	66	CUMNOCK	.8063	.7922	46
DEPSIZE	146	PAISLEY	1.6162	1.9579	80
DEPSIZE	177	HAMILTON	1.0171	1.0435	137
DEPSIZE	180	WISHAW	.8461	.7467	67
DEPSIZE	235	EDINBURGH	1.5520	1.1520	168

0 TOTAL CASES = 613
MISSING CASES = 9 OR 1.5 PCT.

22 APR 88 SBG BUS DRIVER STUDY PAGE 38
12:03:54 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE ANCOL AVERAGE NO OF NON-COLLS
BROKEN DOWN BY DEPSIZE

0VARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
0FOR ENTIRE POPULATION			.7664	1.7554	612
DEPSIZE	11	FRASERBURGH	.2130	.1554	11
DEPSIZE	13	FORRES	.5527	.6396	6
DEPSIZE	20	HAWICK	.0159	.0594	14
DEPSIZE	23	FORT WILLIAM	.1111	.1949	15
DEPSIZE	39	PETERHEAD	1.0801	2.7543	24
DEPSIZE	40	ALLOA	2.1625	6.5550	24
DEPSIZE	42	ELGIN	.5908	.3482	17
DEPSIZE	66	CUMNOCK	.3180	.3289	46
DEPSIZE	146	PAISLEY	1.0249	1.5489	81
DEPSIZE	177	HAMILTON	1.0464	.9802	137
DEPSIZE	180	WISHAW	.8052	1.0564	67
DEPSIZE	235	EDINBURGH	.4629	1.1020	170

0 TOTAL CASES = 613
MISSING CASES = 1 OR 0.2 PCT.

22 APR 88 SBG BUS DRIVER STUDY PAGE 39
12:03:54 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE AAA1 NOT AT FAULT
BROKEN DOWN BY DEPSIZE

0VARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
0FOR ENTIRE POPULATION			1.0290	1.1032	604
DEPSIZE	11	FRASERBURGH	.3535	.1750	11
DEPSIZE	13	FORRES	1.1993	1.1451	6
DEPSIZE	20	HAWICK	.0159	.0594	14
DEPSIZE	23	FORT WILLIAM	.8152	1.0342	15
DEPSIZE	39	PETERHEAD	.6114	.4170	22
DEPSIZE	40	ALLOA	.5932	.4315	21
DEPSIZE	42	ELGIN	1.0345	.4961	17
DEPSIZE	66	CUMNOCK	.9375	.7256	46
DEPSIZE	146	PAISLEY	1.6696	1.6663	80
DEPSIZE	177	HAMILTON	1.4654	1.1765	137
DEPSIZE	180	WISHAW	1.2327	1.2567	67
DEPSIZE	235	EDINBURGH	.5622	.4800	168

0 TOTAL CASES = 613
MISSING CASES = 9 OR 1.5 PCT.

22 APR 88 SBG BUS DRIVER STUDY PAGE 40
12:03:54 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE AAA2 NO ACTION
BROKEN DOWN BY DEPSIZE

0VARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
0FOR ENTIRE POPULATION			.3424	.5913	604
DEPSIZE	11	FRASERBURGH	.2415	.2310	11
DEPSIZE	13	FORRES	.2526	.1999	6
DEPSIZE	20	HAWICK	.0441	.1160	14
DEPSIZE	23	FORT WILLIAM	.0986	.1779	15
DEPSIZE	39	PETERHEAD	.4212	.3827	22
DEPSIZE	40	ALLOA	.0380	.1134	21
DEPSIZE	42	ELGIN	.1329	.1392	17
DEPSIZE	66	CUMNOCK	.1582	.2767	46
DEPSIZE	146	PAISLEY	.0146	.0715	80
DEPSIZE	177	HAMILTON	.5779	.7449	137
DEPSIZE	180	WISHAW	.0000	.0000	67
DEPSIZE	235	EDINBURGH	.5988	.7123	168

0 TOTAL CASES = 613
MISSING CASES = 9 OR 1.5 PCT.

22 APR 88 SBG BUS DRIVER STUDY PAGE 41
12:03:54 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE AAA3 WARNING
BROKEN DOWN BY DEPSIZE

0VARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
0FOR ENTIRE POPULATION			.2744	.4513	604
DEPSIZE	11	FRASERBURGH	.2589	.2314	11
DEPSIZE	13	FORRES	.3261	.4024	6
DEPSIZE	20	HAWICK	.3743	.3924	14
DEPSIZE	23	FORT WILLIAM	.1599	.2259	15
DEPSIZE	39	PETERHEAD	.5240	.7122	22
DEPSIZE	40	ALLOA	.5002	.5876	21
DEPSIZE	42	ELGIN	.2253	.3258	17
DEPSIZE	66	CUMNOCK	.0114	.0543	46
DEPSIZE	146	PAISLEY	.3758	.6212	80
DEPSIZE	177	HAMILTON	.0193	.1026	137
DEPSIZE	180	WISHAW	.3663	.4404	67
DEPSIZE	235	EDINBURGH	.4146	.4580	168

0 TOTAL CASES = 613
MISSING CASES = 9 OR 1.5 PCT.

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22 APR 88 SBG BUS DRIVER STUDY PAGE 42
12:03:54 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE AAA4 WRITTEN WARNING
BROKEN DOWN BY DEPSIZE

OVARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
OFOR ENTIRE POPULATION			.0492	.1850	604
DEPSIZE	11	FRASERBURGH	.0000	.0000	11
DEPSIZE	13	FORRES	.0758	.1856	6
DEPSIZE	20	HAWICK	.0447	.0894	14
DEPSIZE	23	FORT WILLIAM	.1456	.1796	15
DEPSIZE	39	PETERHEAD	.0000	.0000	22
DEPSIZE	40	ALLOA	.0087	.0397	21
DEPSIZE	42	ELGIN	.0000	.0000	17
DEPSIZE	66	CUMNOCK	.0000	.0000	46
DEPSIZE	146	PAISLEY	.1178	.4042	80
DEPSIZE	177	HAMILTON	.0036	.0427	137
DEPSIZE	180	WISHAW	.0224	.1042	67
DEPSIZE	235	EDINBURGH	.0883	.1665	168

0 TOTAL CASES = 613
MISSING CASES = 9 OR 1.5 PCT.

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22 APR 88 SBG BUS DRIVER STUDY PAGE 43
12:03:56 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE AAA5 FINAL WARNING
BROKEN DOWN BY DEPSIZE

OVARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
OFOR ENTIRE POPULATION			.0147	.2177	604
DEPSIZE	11	FRASERBURGH	.0000	.0000	11
DEPSIZE	13	FORRES	.0000	.0000	6
DEPSIZE	20	HAWICK	.0000	.0000	14
DEPSIZE	23	FORT WILLIAM	.0087	.0335	15
DEPSIZE	39	PETERHEAD	.0000	.0000	22
DEPSIZE	40	ALLOA	.0000	.0000	21
DEPSIZE	42	ELGIN	.0000	.0000	17
DEPSIZE	66	CUMNOCK	.0000	.0000	46
DEPSIZE	146	PAISLEY	.0972	.5839	80
DEPSIZE	177	HAMILTON	.0000	.0000	137
DEPSIZE	180	WISHAW	.0149	.1222	67
DEPSIZE	235	EDINBURGH	.0000	.0000	168

0 TOTAL CASES = 613
MISSING CASES = 9 OR 1.5 PCT.

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22 APR 88 SBG BUS DRIVER STUDY PAGE 44
12:03:56 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE AAA6 SUSPENSIONS
BROKEN DOWN BY DEPSIZE

OVARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
OFOR ENTIRE POPULATION			.1011	.4577	604
DEPSIZE	11	FRASERBURGH	.0111	.0368	11
DEPSIZE	13	FORRES	.0758	.1856	6
DEPSIZE	20	HAWICK	.0000	.0000	14
DEPSIZE	23	FORT WILLIAM	.0392	.1519	15
DEPSIZE	39	PETERHEAD	.0814	.1573	22
DEPSIZE	40	ALLOA	.0642	.1762	21
DEPSIZE	42	ELGIN	.0215	.0479	17
DEPSIZE	66	CUMNOCK	.0172	.0657	46
DEPSIZE	146	PAISLEY	.2895	1.1434	80
DEPSIZE	177	HAMILTON	.0000	.0000	137
DEPSIZE	180	WISHAW	.0149	.1222	67
DEPSIZE	235	EDINBURGH	.1870	.2837	168

0 TOTAL CASES = 613
MISSING CASES = 9 OR 1.5 PCT.

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Appendix B23: Performance data by depot (contd)

0- - - - D E S C R I P T I O N O F S U B P O P U L A T I O N S - - - - -

CRITERION VARIABLE AAA7 DISM THEN REINST
BROKEN DOWN BY DEPSIZE

0VARIABLE	VALUE	LABEL	MEAN	STD DEV	CASES
0FOR ENTIRE POPULATION			.0061	.1361	603
DEPSIZE	11	FRASERBURGH	.0000	.0000	11
DEPSIZE	13	FORRES	.0000	.0000	6
DEPSIZE	20	HAWICK	.0000	.0000	14
DEPSIZE	23	FORT WILLIAM	.0000	.0000	15
DEPSIZE	39	PETERHEAD	.0055	.0260	22
DEPSIZE	40	ALLOA	.0000	.0000	21
DEPSIZE	42	ELGIN	.0000	.0000	17
DEPSIZE	66	CUMNOCK	.0000	.0000	46
DEPSIZE	146	PAISLEY	.0422	.3750	79
DEPSIZE	177	HAMILTON	.0000	.0000	137
DEPSIZE	180	WISHAW	.0000	.0000	67
DEPSIZE	235	EDINBURGH	.0012	.0154	168

0 TOTAL CASES = 613
MISSING CASES = 10 OR 1.6 PCT.

<u>Appendix C1:</u> Intercorrelations

(a) Background variables
(b) Intelligence variables

22 APR 88 SPSS-X RELEASE 2.2 FOR IBM/MVS
16:35:48 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - - - - - - - - - - - P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S - - - - -
0

	AGE	SERVICE	JOINAGE	CARLIC	PREVJOBS	DEPSIZE	DISTHQ
AGE	1.0000	.5659	.7461	.7806	-.0934	-.1785	.1827
	(0)	(599)	(599)	(363)	(405)	(602)	(602)
	P= .	P= .000	P= .000	P= .000	P= .030	P= .000	P= .000
SERVICE	.5659	1.0000	-.1267	-.0617	-.0164	-.1353	.1091
	(599)	(0)	(599)	(368)	(411)	(608)	(608)
	P= .000	P= .	P= .001	P= .119	P= .370	P= .000	P= .004
JOINAGE	.7461	-.1267	1.0000	.8663	-.0982	-.1047	.1304
	(599)	(599)	(0)	(363)	(405)	(599)	(599)
	P= .000	P= .001	P= .	P= .000	P= .024	P= .005	P= .001
CARLIC	.7806	-.0617	.8663	1.0000	-.1016	-.2014	.2096
	(363)	(368)	(363)	(0)	(358)	(368)	(368)
	P= .000	P= .119	P= .000	P= .	P= .027	P= .000	P= .000
PREVJOBS	-.0934	-.0164	-.0982	-.1016	1.0000	.0330	-.0194
	(405)	(411)	(405)	(358)	(0)	(411)	(411)
	P= .030	P= .370	P= .024	P= .027	P= .	P= .252	P= .347
DEPSIZE	-.1785	-.1353	-.1047	-.2014	.0330	1.0000	-.7881
	(602)	(608)	(599)	(368)	(411)	(0)	(613)
	P= .000	P= .000	P= .005	P= .000	P= .252	P= .	P= .000
DISTHQ	.1827	.1091	.1304	.2096	-.0194	-.7881	1.0000
	(602)	(608)	(599)	(368)	(411)	(613)	(0)
	P= .000	P= .004	P= .001	P= .000	P= .347	P= .000	P= .

0(COEFFICIENT / (CASES) / 1-TAILED SIG) " . " IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED
-
22 APR 88 SPSS-X RELEASE 2.2 FOR IBM/MVS
16:35:48 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - - - - - - - - - - - P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S - - - - -
0

	WRTRIGHT	WRTWRONG	CF1	CF2	CF3	CF4	CFTOTAL	SPFB
WRTRIGHT	1.0000	.0628	.3944	.3253	.4459	.3232	.5019	.3190
	(0)	(611)	(610)	(610)	(610)	(610)	(610)	(590)
	P= .	P= .060	P= .000	P= .000	P= .000	P= .000	P= .000	P= .000
WRTWRONG	.0628	1.0000	-.0287	.0149	-.0782	-.0368	-.0446	.0010
	(611)	(0)	(610)	(610)	(610)	(610)	(610)	(590)
	P= .060	P= .	P= .239	P= .356	P= .027	P= .182	P= .136	P= .491
CF1	.3944	-.0287	1.0000	.3990	.5194	.3871	.8037	.2896
	(610)	(610)	(0)	(612)	(612)	(612)	(612)	(589)
	P= .000	P= .239	P= .	P= .000	P= .000	P= .000	P= .000	P= .000
CF2	.3253	.0149	.3990	1.0000	.4119	.3040	.6844	.2160
	(610)	(610)	(612)	(0)	(612)	(612)	(612)	(589)
	P= .000	P= .356	P= .000	P= .	P= .000	P= .000	P= .000	P= .000
CF3	.4459	-.0782	.5194	.4119	1.0000	.4062	.7982	.3455
	(610)	(610)	(612)	(612)	(0)	(612)	(612)	(589)
	P= .000	P= .027	P= .000	P= .000	P= .	P= .000	P= .000	P= .000
CF4	.3232	-.0368	.3871	.3040	.4062	1.0000	.6831	.2308
	(610)	(610)	(612)	(612)	(612)	(0)	(612)	(589)
	P= .000	P= .182	P= .000	P= .000	P= .000	P= .	P= .000	P= .000
CFTOTAL	.5019	-.0446	.8037	.6844	.7982	.6831	1.0000	.3683
	(610)	(610)	(612)	(612)	(612)	(612)	(0)	(589)
	P= .000	P= .136	P= .000	P= .000	P= .000	P= .000	P= .	P= .000
SPFB	.3190	.0010	.2896	.2160	.3455	.2308	.3683	1.0000
	(590)	(590)	(589)	(589)	(589)	(589)	(589)	(0)
	P= .000	P= .491	P= .000	P= .000	P= .000	P= .000	P= .000	P= .

0(COEFFICIENT / (CASES) / 1-TAILED SIG) " . " IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED

Appendix C2: Intercorrelations - test data

22 APR 88 SPSS-X RELEASE 2.2 FOR IBM/MVS
16:35:48 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - - - - - - - - - - - - P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S - - - - - - - - - - - - - - -
0

	WRTRIGHT	WRTWRONG	CFTOTAL	SPFA	SPFB	SPFC	SPFE	SPFF	SPFG	SPFH	SPFI
WRTRIGHT	1.0000	.0628	.5019	-.0624	.3190	.0876	.0744	.0994	-.0249	.0601	-.0542
	(0)	(611)	(610)	(590)	(590)	(590)	(590)	(590)	(590)	(590)	(590)
	P= .	P= .060	P= .000	P= .065	P= .000	P= .017	P= .036	P= .008	P= .273	P= .072	P= .094
WRTWRONG	.0628	1.0000	-.0446	-.0050	.0010	-.0998	.0667	-.0110	-.0795	.0158	.0363
	(611)	(0)	(610)	(590)	(590)	(590)	(590)	(590)	(590)	(590)	(590)
	P= .060	P= .	P= .136	P= .452	P= .491	P= .008	P= .053	P= .395	P= .027	P= .350	P= .190
CFTOTAL	.5019	-.0446	1.0000	-.1355	.3683	.1000	.1577	.1269	-.0402	.0223	-.1665
	(610)	(610)	(0)	(589)	(589)	(589)	(589)	(589)	(589)	(589)	(589)
	P= .000	P= .136	P= .	P= .000	P= .000	P= .008	P= .000	P= .001	P= .165	P= .295	P= .000
SPFA	-.0624	-.0050	-.1355	1.0000	-.1009	.1011	.0308	.2872	.1166	.3169	.1099
	(590)	(590)	(589)	(0)	(590)	(590)	(590)	(590)	(590)	(590)	(590)
	P= .065	P= .452	P= .000	P= .	P= .007	P= .007	P= .228	P= .000	P= .002	P= .000	P= .004
SPFB	.3190	.0010	.3683	-.1009	1.0000	-.0012	.0363	-.0371	-.0177	.0512	-.1242
	(590)	(590)	(589)	(590)	(0)	(590)	(590)	(590)	(590)	(590)	(590)
	P= .000	P= .491	P= .000	P= .007	P= .	P= .489	P= .189	P= .184	P= .334	P= .107	P= .001
SPFC	.0876	-.0998	.1000	.1011	-.0012	1.0000	-.0055	.1709	.1290	.3112	-.0101
	(590)	(590)	(589)	(590)	(590)	(0)	(590)	(590)	(590)	(590)	(590)
	P= .017	P= .008	P= .008	P= .007	P= .489	P= .	P= .447	P= .000	P= .001	P= .000	P= .403
SPFE	.0744	.0667	.1577	.0308	.0363	-.0055	1.0000	.3534	-.0924	.3936	-.1577
	(590)	(590)	(589)	(590)	(590)	(590)	(0)	(590)	(590)	(590)	(590)
	P= .036	P= .053	P= .000	P= .228	P= .189	P= .447	P= .	P= .000	P= .012	P= .000	P= .000
SPFF	.0994	-.0110	.1269	.2872	-.0371	.1709	.3534	1.0000	-.0547	.5885	-.1697
	(590)	(590)	(589)	(590)	(590)	(590)	(590)	(0)	(590)	(590)	(590)
	P= .008	P= .395	P= .001	P= .000	P= .184	P= .000	P= .000	P= .	P= .092	P= .000	P= .000
SPFG	-.0249	-.0795	-.0402	.1166	-.0177	.1290	-.0924	-.0547	1.0000	.1454	.0375
	(590)	(590)	(589)	(590)	(590)	(590)	(590)	(590)	(0)	(590)	(590)
	P= .273	P= .027	P= .165	P= .002	P= .334	P= .001	P= .012	P= .092	P= .	P= .000	P= .182
SPFH	.0601	.0158	.0223	.3169	.0512	.3112	.3936	.5885	.1454	1.0000	-.0773
	(590)	(590)	(589)	(590)	(590)	(590)	(590)	(590)	(590)	(0)	(590)
	P= .072	P= .350	P= .295	P= .000	P= .107	P= .000	P= .000	P= .000	P= .000	P= .	P= .030
SPFI	-.0542	.0363	-.1665	.1099	-.1242	-.0101	-.1577	-.1697	.0375	-.0773	1.0000
	(590)	(590)	(589)	(590)	(590)	(590)	(590)	(590)	(590)	(590)	(0)
	P= .094	P= .190	P= .000	P= .004	P= .001	P= .403	P= .000	P= .000	P= .182	P= .030	P= .
SPFL	-.0954	.0492	-.1102	.0217	-.0283	-.3344	.3302	.0950	-.0148	.0225	-.0788
	(590)	(590)	(589)	(590)	(590)	(590)	(590)	(590)	(590)	(590)	(590)
	P= .010	P= .117	P= .004	P= .299	P= .246	P= .000	P= .000	P= .011	P= .359	P= .293	P= .028
SPFM	.1147	.0551	.1197	-.1439	.1267	.0642	.0368	-.0449	-.1792	.0259	.0749
	(590)	(590)	(589)	(590)	(590)	(590)	(590)	(590)	(590)	(590)	(590)
	P= .003	P= .091	P= .002	P= .000	P= .001	P= .060	P= .186	P= .138	P= .000	P= .265	P= .034
SPFN	-.1179	-.1041	-.1053	.0312	-.0789	-.0037	-.2882	-.1793	.1170	-.2004	.0878
	(590)	(590)	(589)	(590)	(590)	(590)	(590)	(590)	(590)	(590)	(590)
	P= .002	P= .006	P= .005	P= .225	P= .028	P= .464	P= .000	P= .000	P= .002	P= .000	P= .017
SPFO	-.1439	.0932	-.1068	-.0826	-.1037	-.3624	-.1120	-.2122	-.0865	-.4189	.0562
	(590)	(590)	(589)	(590)	(590)	(590)	(590)	(590)	(590)	(590)	(590)
	P= .000	P= .012	P= .005	P= .023	P= .006	P= .000	P= .003	P= .000	P= .018	P= .000	P= .086
SPFQ1	.0525	.0295	.0293	-.0675	.0424	-.0468	.2565	.1450	-.1881	.0900	-.1446
	(590)	(590)	(589)	(590)	(590)	(590)	(590)	(590)	(590)	(590)	(590)
	P= .102	P= .237	P= .239	P= .051	P= .152	P= .128	P= .000	P= .000	P= .000	P= .014	P= .000
SPFQ2	.0199	.0602	.0532	-.3528	.0774	-.1050	-.1443	-.4267	-.1083	-.4254	-.0448
	(590)	(590)	(589)	(590)	(590)	(590)	(590)	(590)	(590)	(590)	(590)
	P= .315	P= .072	P= .099	P= .000	P= .030	P= .005	P= .000	P= .000	P= .005	P= .000	P= .139
SPFQ3	.0020	-.0319	-.0464	.0992	-.0099	.3742	-.1967	-.0375	.4341	.1325	.0325
	(590)	(590)	(589)	(590)	(590)	(590)	(590)	(590)	(590)	(590)	(590)
	P= .480	P= .219	P= .131	P= .008	P= .405	P= .000	P= .000	P= .181	P= .000	P= .001	P= .215
SPFQ4	-.0088	.1025	.0028	-.1347	-.0107	-.6162	.1614	-.0408	-.1638	-.2773	-.1121
	(590)	(590)	(589)	(590)	(590)	(590)	(590)	(590)	(590)	(590)	(590)
	P= .415	P= .006	P= .473	P= .001	P= .378	P= .000	P= .000	P= .161	P= .000	P= .000	P= .003

0(COEFFICIENT / (CASES) / 1-TAILED SIG)   " . " IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED

22 APR 88 SPSS-X RELEASE 2.2 FOR IBM/MVS
16:35:48 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - - - - - - - - - - - P E A R S O N C O R R E L A T I O N C O E F F I C I E N T S - - -
0

	SPFL	SPFM	SPFN	SPFO	SPFQ1	SPFQ2	SPFQ3	SPFQ4
WRTRIGHT	-.0954 (590) P= .010	.1147 (590) P= .003	-.1179 (590) P= .002	-.1439 (590) P= .000	.0525 (590) P= .102	.0199 (590) P= .315	.0020 (590) P= .480	-.0088 (590) P= .415
WRTWRONG	.0492 (590) P= .117	.0551 (590) P= .091	-.1041 (590) P= .006	.0932 (590) P= .012	.0295 (590) P= .237	.0602 (590) P= .072	-.0319 (590) P= .219	.1025 (590) P= .006
CFTOTAL	-.1102 (589) P= .004	.1197 (589) P= .002	-.1053 (589) P= .005	-.1068 (589) P= .005	.0293 (589) P= .239	.0532 (589) P= .099	-.0464 (589) P= .131	.0028 (589) P= .473
SPFA	.0217 (590) P= .299	-.1439 (590) P= .000	.0312 (590) P= .225	-.0826 (590) P= .023	-.0675 (590) P= .051	-.3528 (590) P= .000	.0992 (590) P= .008	-.1347 (590) P= .001
SPFB	-.0283 (590) P= .246	.1267 (590) P= .001	-.0789 (590) P= .028	-.1037 (590) P= .006	.0424 (590) P= .152	.0774 (590) P= .030	-.0099 (590) P= .405	-.0107 (590) P= .398
SPFC	-.3344 (590) P= .000	.0642 (590) P= .060	-.0037 (590) P= .464	-.5624 (590) P= .000	-.0468 (590) P= .128	-.1050 (590) P= .005	.3742 (590) P= .000	-.6162 (590) P= .000
SPFE	.3302 (590) P= .000	.0368 (590) P= .186	-.2882 (590) P= .000	-.1120 (590) P= .003	.2565 (590) P= .000	-.1443 (590) P= .000	-.1967 (590) P= .000	.1614 (590) P= .000
SPFF	.0950 (590) P= .011	-.0449 (590) P= .138	-.1793 (590) P= .000	-.2122 (590) P= .000	.1450 (590) P= .000	-.4267 (590) P= .000	-.0375 (590) P= .181	-.0408 (590) P= .161
SPFG	-.0148 (590) P= .359	-.1792 (590) P= .000	.1170 (590) P= .002	-.0865 (590) P= .018	-.1881 (590) P= .000	-.1053 (590) P= .005	.4341 (590) P= .000	-.1638 (590) P= .000
SPFH	.0225 (590) P= .293	.0259 (590) P= .265	-.2004 (590) P= .000	-.4189 (590) P= .000	.0900 (590) P= .014	-.4254 (590) P= .000	.1325 (590) P= .001	-.2773 (590) P= .000
SPFI	-.0788 (590) P= .028	.0749 (590) P= .034	.0878 (590) P= .017	.0562 (590) P= .086	-.1446 (590) P= .000	-.0448 (590) P= .139	.0325 (590) P= .215	-.1121 (590) P= .003
SPFL	1.0000 (0) P= .	-.0854 (590) P= .019	-.0956 (590) P= .010	.2397 (590) P= .000	.2234 (590) P= .000	-.0091 (590) P= .413	-.1853 (590) P= .000	.3648 (590) P= .000
SPFM	-.0854 (590) P= .019	1.0000 (0) P= .	-.1876 (590) P= .000	-.1232 (590) P= .001	.1070 (590) P= .005	.1055 (590) P= .005	-.1609 (590) P= .000	-.0617 (590) P= .067
SPFN	-.0956 (590) P= .010	-.1876 (590) P= .000	1.0000 (0) P= .	.0965 (590) P= .010	-.2416 (590) P= .000	.0522 (590) P= .103	.0908 (590) P= .014	-.0409 (590) P= .160
SPFO	.2397 (590) P= .000	-.1232 (590) P= .001	.0965 (590) P= .010	1.0000 (0) P= .	-.0632 (590) P= .063	.0894 (590) P= .015	-.2879 (590) P= .000	.5563 (590) P= .000
SPFQ1	.2234 (590) P= .000	.1070 (590) P= .005	-.2416 (590) P= .000	-.0632 (590) P= .063	1.0000 (0) P= .	.0369 (590) P= .185	-.1159 (590) P= .002	.0851 (590) P= .019
SPFQ2	-.0091 (590) P= .413	.1055 (590) P= .005	.0522 (590) P= .103	.0894 (590) P= .015	.0369 (590) P= .185	1.0000 (0) P= .	-.0206 (590) P= .309	.0918 (590) P= .013
SPFQ3	-.1853 (590) P= .000	-.1609 (590) P= .000	.0908 (590) P= .014	-.2879 (590) P= .000	-.1159 (590) P= .002	-.0206 (590) P= .309	1.0000 (0) P= .	-.4338 (590) P= .000
SPFQ4	.3648 (590) P= .000	-.0617 (590) P= .067	-.0409 (590) P= .160	.5563 (590) P= .000	.0851 (590) P= .019	.0918 (590) P= .013	-.4338 (590) P= .000	1.0000 (0) P= .

0(COEFFICIENT / (CASES) / 1-TAILED SIG) " . " IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTE

Appendix C4: Correlations - test data against background

22 APR 88 SPSS-X RELEASE 2.2 FOR IBM/MVS
16:38:38 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - - - - - - - - - - - P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S - - - -
0

	AGE	SERVICE	JOINAGE	CARLIC	PREVJOBS	DEPSIZE	DISTHQ
WRTRIGHT	-.3727	-.2677	-.2337	-.2720	.1024	.1458	-.0757
	(600)	(606)	(597)	(367)	(410)	(611)	(611)
	P= .000	P= .000	P= .000	P= .000	P= .019	P= .000	P= .031
WRTWRONG	.0840	.0423	.0707	.0372	.0182	.0675	-.0248
	(600)	(606)	(597)	(367)	(410)	(611)	(611)
	P= .020	P= .149	P= .042	P= .239	P= .357	P= .048	P= .270
CFTOTAL	-.4211	-.2791	-.2822	-.2884	.0326	.1129	-.0635
	(601)	(607)	(598)	(368)	(411)	(612)	(612)
	P= .000	P= .000	P= .000	P= .000	P= .255	P= .003	P= .058
SPFA	.0410	-.0004	.0473	.0314	.0048	-.0880	.0671
	(579)	(585)	(576)	(354)	(395)	(590)	(590)
	P= .162	P= .496	P= .128	P= .278	P= .462	P= .016	P= .052
SPFB	-.0555	-.0588	-.0259	-.0191	.0415	.1202	-.0708
	(579)	(585)	(576)	(354)	(395)	(590)	(590)
	P= .091	P= .078	P= .267	P= .360	P= .205	P= .002	P= .043
SPFC	-.1216	-.0747	-.0823	-.0407	.0247	.0792	-.0775
	(579)	(585)	(576)	(354)	(395)	(590)	(590)
	P= .002	P= .036	P= .024	P= .223	P= .313	P= .027	P= .030
SPFE	-.1923	-.1800	-.0818	-.1508	.0514	.0372	-.0191
	(579)	(585)	(576)	(354)	(395)	(590)	(590)
	P= .000	P= .000	P= .025	P= .002	P= .154	P= .184	P= .322
SPFF	-.2682	-.2232	-.1413	-.1916	.0393	.0416	-.0495
	(579)	(585)	(576)	(354)	(395)	(590)	(590)
	P= .000	P= .000	P= .000	P= .000	P= .218	P= .156	P= .115
SPFG	.2532	.0973	.2230	.2532	-.0553	-.0971	.0820
	(579)	(585)	(576)	(354)	(395)	(590)	(590)
	P= .000	P= .009	P= .000	P= .000	P= .137	P= .009	P= .023
SPFH	-.0330	-.0886	.0322	-.0221	.0903	.0197	.0037
	(579)	(585)	(576)	(354)	(395)	(590)	(590)
	P= .214	P= .016	P= .220	P= .339	P= .036	P= .316	P= .464
SPFI	.1319	.0764	.0930	.0877	.1070	-.0128	.0188
	(579)	(585)	(576)	(354)	(395)	(590)	(590)
	P= .001	P= .032	P= .013	P= .050	P= .017	P= .378	P= .324
SPFL	.0405	-.0115	.0583	.0209	.0451	-.0554	.0595
	(579)	(585)	(576)	(354)	(395)	(590)	(590)
	P= .165	P= .391	P= .081	P= .348	P= .186	P= .090	P= .075
SPFM	-.0241	-.0435	.0044	-.0277	.0600	.2014	-.1168
	(579)	(585)	(576)	(354)	(395)	(590)	(590)
	P= .281	P= .147	P= .458	P= .302	P= .117	P= .000	P= .002
SPFN	.1331	.1765	.0179	.1091	-.0824	-.1673	.1533
	(579)	(585)	(576)	(354)	(395)	(590)	(590)
	P= .001	P= .000	P= .334	P= .020	P= .051	P= .000	P= .000
SPFO	.0936	.0867	.0464	.0037	.0025	-.1028	.0862
	(579)	(585)	(576)	(354)	(395)	(590)	(590)
	P= .012	P= .018	P= .133	P= .473	P= .480	P= .006	P= .018
SPFQ1	-.1896	-.1516	-.1082	-.1424	-.0284	.0949	-.1170
	(579)	(585)	(576)	(354)	(395)	(590)	(590)
	P= .000	P= .000	P= .005	P= .004	P= .287	P= .011	P= .002
SPFQ2	.0919	.0668	.0596	.0849	.0154	.0523	-.0058
	(579)	(585)	(576)	(354)	(395)	(590)	(590)
	P= .014	P= .053	P= .076	P= .055	P= .380	P= .102	P= .444
SPFQ3	.1775	.0966	.1271	.1719	-.0096	-.0148	-.0269
	(579)	(585)	(576)	(354)	(395)	(590)	(590)
	P= .000	P= .010	P= .001	P= .001	P= .424	P= .360	P= .257
SPFQ4	-.0626	-.0185	-.0589	-.1511	-.0118	-.0586	.0921
	(579)	(585)	(576)	(354)	(395)	(590)	(590)
	P= .066	P= .327	P= .079	P= .002	P= .408	P= .078	P= .013

0(COEFFICIENT / (CASES) / 1-TAILED SIG) " . " IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED

Appendix C5: Intercorrelations - offences

0- - - - - - - - - - - - - - P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S - - - - - - - - - - - - -

	AD1	AD2	AD3	AD4	AD5	AD6	AD7	AD8	AD9	ACOMP	AVTOTDIS
AD1	1.0000 (0) P= .	.3445 (594) P= .000	.2796 (594) P= .000	.1370 (594) P= .000	.2690 (594) P= .000	.2222 (594) P= .000	.2319 (594) P= .000	.1510 (594) P= .000	.0803 (594) P= .025	.2351 (594) P= .000	.6511 (594) P= .000
AD2	.3445 (594) P= .000	1.0000 (0) P= .	.3026 (594) P= .000	.1486 (594) P= .000	.2829 (594) P= .000	.1209 (594) P= .002	.0666 (594) P= .052	-.0500 (594) P= .112	.0082 (594) P= .421	.2615 (594) P= .000	.6187 (594) P= .000
AD3	.2796 (594) P= .000	.3026 (594) P= .000	1.0000 (0) P= .	.0458 (594) P= .132	.2247 (594) P= .000	.0551 (594) P= .090	.0512 (594) P= .107	.0373 (594) P= .182	.0743 (594) P= .035	.4750 (594) P= .000	.4764 (594) P= .000
AD4	.1370 (594) P= .000	.1486 (594) P= .000	.0458 (594) P= .132	1.0000 (0) P= .	.1441 (594) P= .000	.1513 (594) P= .000	.1590 (594) P= .000	.0710 (594) P= .042	-.0086 (594) P= .417	.4004 (594) P= .000	.3119 (594) P= .000
AD5	.2690 (594) P= .000	.2829 (594) P= .000	.2247 (594) P= .000	.1441 (594) P= .000	1.0000 (0) P= .	.1234 (594) P= .001	.2182 (594) P= .000	.2311 (594) P= .000	.1018 (594) P= .007	.2240 (594) P= .000	.5956 (594) P= .000
AD6	.2222 (594) P= .000	.1209 (594) P= .002	.0551 (594) P= .090	.1513 (594) P= .000	.1234 (594) P= .001	1.0000 (0) P= .	.0854 (594) P= .019	-.0176 (594) P= .335	.0372 (594) P= .183	.2982 (594) P= .000	.2407 (594) P= .000
AD7	.2319 (594) P= .000	.0666 (594) P= .052	.0512 (594) P= .107	.1590 (594) P= .000	.2182 (594) P= .000	.0854 (594) P= .019	1.0000 (0) P= .	.3673 (594) P= .000	.0838 (594) P= .021	.0367 (594) P= .186	.4738 (594) P= .000
AD8	.1510 (594) P= .000	-.0500 (594) P= .112	.0373 (594) P= .182	.0710 (594) P= .042	.2311 (594) P= .000	-.0176 (594) P= .335	.3673 (594) P= .000	1.0000 (0) P= .	.0674 (594) P= .050	-.0210 (594) P= .305	.5579 (594) P= .000
AD9	.0803 (594) P= .025	.0082 (594) P= .421	.0743 (594) P= .035	-.0086 (594) P= .417	.1018 (594) P= .007	.0372 (594) P= .183	.0838 (594) P= .021	.0674 (594) P= .050	1.0000 (0) P= .	.0393 (594) P= .170	.1475 (594) P= .000
ACOMP	.2351 (594) P= .000	.2615 (594) P= .000	.4750 (594) P= .000	.4004 (594) P= .000	.2240 (594) P= .000	.2982 (594) P= .000	.0367 (594) P= .186	-.0210 (594) P= .305	.0393 (594) P= .170	1.0000 (0) P= .	.3731 (594) P= .000
AVTOTDIS	.6511 (594) P= .000	.6187 (594) P= .000	.4764 (594) P= .000	.3119 (594) P= .000	.5956 (594) P= .000	.2407 (594) P= .000	.4738 (594) P= .000	.5579 (594) P= .000	.1475 (594) P= .000	.3731 (594) P= .000	1.0000 (0) P= .
AVLATE	.1852 (383) P= .000	.2383 (383) P= .000	.1098 (383) P= .016	.1344 (383) P= .004	.1452 (383) P= .002	.0858 (383) P= .047	.3486 (383) P= .000	.1648 (383) P= .001	.0329 (383) P= .261	.0720 (383) P= .080	.3400 (383) P= .000
AVABS	.1142 (366) P= .014	-.0943 (366) P= .036	-.0443 (366) P= .199	.0397 (366) P= .225	.0057 (366) P= .457	.0053 (366) P= .460	.2966 (366) P= .000	.2486 (366) P= .000	.0690 (366) P= .094	-.0143 (366) P= .393	.1469 (366) P= .002
SHORTS	.0580 (444) P= .111	-.1893 (444) P= .000	-.0469 (444) P= .162	-.1359 (444) P= .002	-.0281 (444) P= .277	-.0379 (444) P= .213	.1040 (444) P= .014	.3332 (444) P= .000	-.0009 (444) P= .492	-.1028 (444) P= .015	.0582 (444) P= .110
AAD2	.2699 (594) P= .000	.6805 (594) P= .000	.3554 (594) P= .000	.2683 (594) P= .000	.2616 (594) P= .000	.1979 (594) P= .000	-.0190 (594) P= .322	-.1378 (594) P= .000	.0383 (594) P= .176	.4730 (594) P= .000	.4510 (594) P= .000
AAD3	.4699 (594) P= .000	.2534 (594) P= .000	.3696 (594) P= .000	.1827 (594) P= .000	.4940 (594) P= .000	.1655 (594) P= .000	.4648 (594) P= .000	.7541 (594) P= .000	.1157 (594) P= .002	.2088 (594) P= .000	.8245 (594) P= .000
AAD4	.5393 (594) P= .000	.4322 (594) P= .000	.1662 (594) P= .000	.1151 (594) P= .002	.2976 (594) P= .000	.0501 (594) P= .111	.3654 (594) P= .000	.1608 (594) P= .000	.0804 (594) P= .025	.1689 (594) P= .000	.5521 (594) P= .000
AAD5	.2522 (594) P= .000	.1270 (594) P= .001	.0715 (594) P= .041	.0419 (594) P= .154	.2470 (594) P= .000	.0170 (594) P= .340	.5236 (594) P= .000	.2495 (594) P= .000	.1539 (594) P= .000	.0369 (594) P= .184	.3783 (594) P= .000
AAD6	.3271 (594) P= .000	.4078 (594) P= .000	.2397 (594) P= .000	.2360 (594) P= .000	.4257 (594) P= .000	.1368 (594) P= .000	.2889 (594) P= .000	.1140 (594) P= .003	.1767 (594) P= .000	.1716 (594) P= .000	.5197 (594) P= .000
AAD7	.4298 (594) P= .000	.2925 (594) P= .000	-.0018 (594) P= .483	-.0213 (594) P= .302	.0289 (594) P= .241	.0017 (594) P= .484	.0690 (594) P= .047	.0257 (594) P= .266	.0875 (594) P= .016	-.0264 (594) P= .260	.2594 (594) P= .000
ACOMM	.0015 (594) P= .486	.0726 (594) P= .038	-.0195 (594) P= .317	.0718 (594) P= .040	.0275 (594) P= .252	.0168 (594) P= .342	.0276 (594) P= .251	-.0717 (594) P= .040	-.0232 (594) P= .286	.0099 (594) P= .405	.0132 (594) P= .375

0(COEFFICIENT / (CASES) / 1-TAILED SIG)   " . " IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED

Appendix C6: Intercorrelations - offences (contd)

O- - - - - - - - - - - - - - P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S - - - - - - - - - - - - - -
O

	AVLATE	AVABS	SHORTS	AAD2	AAD3	AAD4	AAD5	AAD6	AAD7	ACOMM
AD1	.1852 (383) P= .000	.1142 (366) P= .014	.0580 (444) P= .111	.2699 (594) P= .000	.4699 (594) P= .000	.5393 (594) P= .000	.2522 (594) P= .000	.3271 (594) P= .000	.4298 (594) P= .000	.0015 (594) P= .486
AD2	.2383 (383) P= .000	-.0943 (366) P= .036	-.1893 (444) P= .000	.6805 (594) P= .000	.2534 (594) P= .000	.4322 (594) P= .000	.1270 (594) P= .001	.4078 (594) P= .000	.2925 (594) P= .000	.0726 (594) P= .038
AD3	.1098 (383) P= .016	-.0443 (366) P= .199	-.0469 (444) P= .162	.3554 (594) P= .000	.3696 (594) P= .000	.1662 (594) P= .000	.0715 (594) P= .041	.2397 (594) P= .000	-.0018 (594) P= .483	-.0195 (594) P= .317
AD4	.1344 (383) P= .004	.0397 (366) P= .225	-.1359 (444) P= .002	.2683 (594) P= .000	.1827 (594) P= .000	.1151 (594) P= .002	.0419 (594) P= .154	.2360 (594) P= .000	-.0213 (594) P= .302	.0718 (594) P= .040
AD5	.1452 (383) P= .002	.0057 (366) P= .457	-.0281 (444) P= .277	.2616 (594) P= .000	.4940 (594) P= .000	.2976 (594) P= .000	.2470 (594) P= .000	.4257 (594) P= .000	.0289 (594) P= .241	.0275 (594) P= .252
AD6	.0858 (383) P= .047	.0053 (366) P= .460	-.0379 (444) P= .213	.1979 (594) P= .000	.1655 (594) P= .000	.0501 (594) P= .111	.0170 (594) P= .340	.1368 (594) P= .000	.0017 (594) P= .484	.0168 (594) P= .342
AD7	.3486 (383) P= .000	.2966 (366) P= .000	.1040 (444) P= .014	-.0190 (594) P= .322	.4648 (594) P= .000	.3654 (594) P= .000	.5236 (594) P= .000	.2889 (594) P= .000	.0690 (594) P= .047	.0276 (594) P= .251
AD8	.1648 (383) P= .001	.2486 (366) P= .000	.3332 (444) P= .000	-.1378 (594) P= .000	.7541 (594) P= .000	.1608 (594) P= .000	.2495 (594) P= .000	.1140 (594) P= .003	.0257 (594) P= .266	-.0717 (594) P= .040
AD9	.0329 (383) P= .261	.0690 (366) P= .094	-.0009 (444) P= .492	.0383 (594) P= .176	.1157 (594) P= .002	.0804 (594) P= .025	.1539 (594) P= .000	.1767 (594) P= .000	.0875 (594) P= .016	-.0232 (594) P= .286
ACOMP	.0720 (383) P= .080	-.0143 (366) P= .393	-.1028 (444) P= .015	.4730 (594) P= .000	.2088 (594) P= .000	.1689 (594) P= .000	.0369 (594) P= .184	.1716 (594) P= .000	-.0264 (594) P= .260	.0099 (594) P= .405
AVTOTDIS	.3400 (383) P= .000	.1469 (366) P= .002	.0582 (444) P= .110	.4510 (594) P= .000	.8245 (594) P= .000	.5521 (594) P= .000	.3783 (594) P= .000	.5197 (594) P= .000	.2594 (594) P= .000	.0132 (594) P= .375
AVLATE	1.0000 (0) P= .	.2289 (372) P= .000	-.0450 (364) P= .196	.2326 (383) P= .000	.2229 (383) P= .000	.2370 (383) P= .000	.1533 (383) P= .001	.2205 (383) P= .000	.0524 (383) P= .153	-.0163 (383) P= .375
AVABS	.2289 (372) P= .000	1.0000 (0) P= .	.3144 (349) P= .000	-.1398 (366) P= .004	.2178 (366) P= .000	.1104 (366) P= .017	.2111 (366) P= .000	.0336 (366) P= .261	.1069 (366) P= .020	-.0668 (366) P= .101
SHORTS	-.0450 (364) P= .196	.3144 (349) P= .000	1.0000 (0) P= .	-.2782 (444) P= .000	.2539 (444) P= .000	-.0588 (444) P= .108	.0999 (444) P= .018	-.0980 (444) P= .020	-.0125 (444) P= .397	-.1986 (444) P= .000
AAD2	.2326 (383) P= .000	-.1398 (366) P= .004	-.2782 (444) P= .000	1.0000 (0) P= .	.0072 (594) P= .431	.1809 (594) P= .000	-.0244 (594) P= .276	.2693 (594) P= .000	-.0192 (594) P= .320	.0866 (594) P= .017
AAD3	.2229 (383) P= .000	.2178 (366) P= .000	.2539 (444) P= .000	.0072 (594) P= .431	1.0000 (0) P= .	.2168 (594) P= .000	.2770 (594) P= .000	.2709 (594) P= .000	.0131 (594) P= .375	-.0323 (594) P= .216
AAD4	.2370 (383) P= .000	.1104 (366) P= .017	-.0588 (444) P= .108	.1809 (594) P= .000	.2168 (594) P= .000	1.0000 (0) P= .	.4023 (594) P= .000	.3736 (594) P= .000	.6958 (594) P= .000	.0216 (594) P= .300
AAD5	.1533 (383) P= .001	.2111 (366) P= .000	.0999 (444) P= .018	-.0244 (594) P= .276	.2770 (594) P= .000	.4023 (594) P= .000	1.0000 (0) P= .	.4462 (594) P= .000	.1597 (594) P= .000	-.0363 (594) P= .189
AAD6	.2205 (383) P= .000	.0336 (366) P= .261	-.0980 (444) P= .020	.2693 (594) P= .000	.2709 (594) P= .000	.3736 (594) P= .000	.4462 (594) P= .000	1.0000 (0) P= .	.0867 (594) P= .017	.0380 (594) P= .178
AAD7	.0524 (383) P= .153	.1069 (366) P= .020	-.0125 (444) P= .397	-.0192 (594) P= .320	.0131 (594) P= .375	.6958 (594) P= .000	.1597 (594) P= .000	.0867 (594) P= .017	1.0000 (0) P= .	-.0157 (594) P= .351
ACOMM	-.0163 (383) P= .375	-.0668 (366) P= .101	-.1986 (444) P= .000	.0866 (594) P= .017	-.0323 (594) P= .216	.0216 (594) P= .300	-.0363 (594) P= .189	.0380 (594) P= .178	-.0157 (594) P= .351	1.0000 (0) P= .

O(COEFFICIENT / (CASES) / 1-TAILED SIG)   " . " IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED

Appendix C7: Intercorrelations - accidents

22 APR 88   SPSS-X RELEASE 2.2 FOR IBM/MVS
16:44:24   **E.R.C.C. EMAG-A AMDAHL V7** AMDAHL V7 000001 EMAG-3 (VSS)

0- - - - - - - - - - - - - - P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S - - - - - - - - - - - - - -
0

	AA01	AA02	AA03	AA04	AA05	AA06	AA07	AA08	AA09	ACOL	ANCOL
AA01	1.0000	.1784	-.0375	.0417	-.0154	.3535	.0615	-.0262	-.0011	.8858	.1913
	(0)	(604)	(604)	(604)	(604)	(604)	(604)	(604)	(604)	(604)	(604)
	P= .	P= .000	P= .179	P= .153	P= .352	P= .000	P= .065	P= .260	P= .490	P= .000	P= .000
AA02	.1784	1.0000	-.0272	-.0123	-.0164	-.0180	.1030	.0510	-.0182	.2705	.0704
	(604)	(0)	(604)	(604)	(604)	(604)	(604)	(604)	(604)	(604)	(604)
	P= .000	P= .	P= .252	P= .381	P= .344	P= .330	P= .006	P= .105	P= .328	P= .000	P= .042
AA03	-.0375	-.0272	1.0000	.3352	-.0191	-.0141	-.0108	.0344	-.0078	.2452	-.0208
	(604)	(604)	(0)	(604)	(604)	(604)	(604)	(604)	(604)	(604)	(604)
	P= .179	P= .252	P= .	P= .000	P= .319	P= .364	P= .396	P= .200	P= .424	P= .000	P= .305
AA04	.0417	-.0123	.3352	1.0000	.2391	.2494	.0433	-.0474	.0551	.4594	.2043
	(604)	(604)	(604)	(0)	(604)	(604)	(604)	(604)	(604)	(604)	(604)
	P= .153	P= .381	P= .000	P= .	P= .000	P= .000	P= .144	P= .122	P= .088	P= .000	P= .000
AA05	-.0154	-.0164	-.0191	.2391	1.0000	.2511	-.0404	.0000	.0712	.0710	.3670
	(604)	(604)	(604)	(604)	(0)	(604)	(604)	(604)	(604)	(604)	(604)
	P= .352	P= .344	P= .319	P= .000	P= .	P= .000	P= .161	P= .500	P= .040	P= .041	P= .000
AA06	.3535	-.0180	-.0141	.2494	.2511	1.0000	-.0935	-.0277	-.0440	.3903	.4389
	(604)	(604)	(604)	(604)	(604)	(0)	(604)	(604)	(604)	(604)	(604)
	P= .000	P= .330	P= .364	P= .000	P= .000	P= .	P= .011	P= .249	P= .140	P= .000	P= .000
AA07	.0615	.1030	-.0108	.0433	-.0404	-.0935	1.0000	.3534	-.0381	.0801	.7403
	(604)	(604)	(604)	(604)	(604)	(604)	(0)	(604)	(604)	(604)	(604)
	P= .065	P= .006	P= .396	P= .144	P= .161	P= .011	P= .	P= .000	P= .175	P= .025	P= .000
AA08	-.0262	.0510	.0344	-.0474	.0000	-.0277	.3534	1.0000	.0098	-.0282	.4589
	(604)	(604)	(604)	(604)	(604)	(604)	(604)	(0)	(604)	(604)	(604)
	P= .260	P= .105	P= .200	P= .122	P= .500	P= .249	P= .000	P= .	P= .405	P= .244	P= .000
AA09	-.0011	-.0182	-.0078	.0551	.0712	-.0440	-.0381	.0098	1.0000	.0162	.1823
	(604)	(604)	(604)	(604)	(604)	(604)	(604)	(604)	(0)	(604)	(604)
	P= .490	P= .328	P= .424	P= .088	P= .040	P= .140	P= .175	P= .405	P= .	P= .346	P= .000
ACOL	.8858	.2705	.2452	.4594	.0710	.3903	.0801	-.0282	.0162	1.0000	.2452
	(604)	(604)	(604)	(604)	(604)	(604)	(604)	(604)	(604)	(0)	(604)
	P= .000	P= .000	P= .000	P= .000	P= .041	P= .000	P= .025	P= .244	P= .346	P= .	P= .000
ANCOL	.1913	.0704	-.0208	.2043	.3670	.4389	.7403	.4589	.1823	.2452	1.0000
	(604)	(604)	(604)	(604)	(604)	(604)	(604)	(604)	(604)	(604)	(0)
	P= .000	P= .042	P= .305	P= .000	P= .000	P= .000	P= .000	P= .000	P= .000	P= .000	P= .
AAA1	.4204	.0992	.1466	.2638	.3109	.4016	.6237	.3557	.1462	.4927	.8436
	(604)	(604)	(604)	(604)	(604)	(604)	(604)	(604)	(604)	(604)	(604)
	P= .000	P= .007	P= .000	P= .000	P= .000	P= .000	P= .000	P= .000	P= .000	P= .000	P= .000
AAA2	.4423	.1049	-.0234	.2190	-.0804	.1269	.2121	-.0351	-.0167	.4689	.1761
	(604)	(604)	(604)	(604)	(604)	(604)	(604)	(604)	(604)	(604)	(604)
	P= .000	P= .005	P= .283	P= .000	P= .024	P= .001	P= .000	P= .195	P= .341	P= .000	P= .000
AAA3	.2602	.0053	.0945	.4896	.1525	.1847	-.1610	-.0447	.0461	.4202	.0027
	(604)	(604)	(604)	(604)	(604)	(604)	(604)	(604)	(604)	(604)	(604)
	P= .000	P= .448	P= .010	P= .000	P= .000	P= .000	P= .000	P= .136	P= .129	P= .000	P= .474
AAA4	.2075	.0082	-.0137	.0489	.0538	.0172	-.0082	-.0306	-.0440	.1943	-.0059
	(604)	(604)	(604)	(604)	(604)	(604)	(604)	(604)	(604)	(604)	(604)
	P= .000	P= .420	P= .368	P= .115	P= .093	P= .336	P= .420	P= .226	P= .140	P= .000	P= .443
AAA5	.5265	.0104	-.0100	.0136	.0570	.4725	-.0345	-.0153	.0632	.4542	.2191
	(604)	(604)	(604)	(604)	(604)	(604)	(604)	(604)	(604)	(604)	(604)
	P= .000	P= .399	P= .403	P= .369	P= .081	P= .000	P= .199	P= .354	P= .060	P= .000	P= .000
AAA6	.5881	.0124	-.0129	.0779	.0157	.5269	-.0797	-.0238	-.0089	.3303	.1814
	(604)	(604)	(604)	(604)	(604)	(604)	(604)	(604)	(604)	(604)	(604)
	P= .000	P= .381	P= .376	P= .028	P= .350	P= .000	P= .025	P= .279	P= .414	P= .000	P= .000
AAA7	-.0343	-.0099	.7210	.2792	-.0094	-.0157	-.0226	-.0101	-.0169	.1858	-.0322
	(603)	(603)	(603)	(603)	(603)	(603)	(603)	(603)	(603)	(603)	(603)
	P= .200	P= .404	P= .000	P= .000	P= .409	P= .350	P= .290	P= .402	P= .339	P= .000	P= .215

0(COEFFICIENT / (CASES) / 1-TAILED SIG)   " . " IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED

Appendix C8: Intercorrelations - accidents (contd)

22 APR 88 SPSS-X RELEASE 2.2 FOR IBM/MVS
16:44:26 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - - - - - - - - - - - - P E A R S O N C O R R E L A T I O N C O E F F I C I E N T S
0

	AAA1	AAA2	AAA3	AAA4	AAA5	AAA6	AAA7
AA01	.4204	.4423	.2602	.2075	.5265	.5881	-.0343
	(604)	(604)	(604)	(604)	(604)	(604)	(603)
	P= .000	P= .000	P= .000	P= .000	P= .000	P= .000	P= .200
AA02	.0992	.1049	.0053	.0082	.0104	.0124	-.0099
	(604)	(604)	(604)	(604)	(604)	(604)	(603)
	P= .007	P= .005	P= .448	P= .420	P= .399	P= .381	P= .404
AA03	.1466	-.0234	.0945	-.0137	-.0100	-.0129	.7210
	(604)	(604)	(604)	(604)	(604)	(604)	(603)
	P= .000	P= .283	P= .010	P= .368	P= .403	P= .376	P= .000
AA04	.2638	.2190	.4896	.0489	.0136	.0779	.2792
	(604)	(604)	(604)	(604)	(604)	(604)	(603)
	P= .000	P= .000	P= .000	P= .115	P= .369	P= .028	P= .000
AA05	.3109	-.0804	.1525	.0538	.0570	.0157	-.0094
	(604)	(604)	(604)	(604)	(604)	(604)	(603)
	P= .000	P= .024	P= .000	P= .093	P= .081	P= .350	P= .409
AA06	.4016	.1269	.1847	.0172	.4725	.5269	-.0157
	(604)	(604)	(604)	(604)	(604)	(604)	(603)
	P= .000	P= .001	P= .000	P= .336	P= .000	P= .000	P= .350
AA07	.6237	.2121	-.1610	-.0082	-.0345	-.0797	-.0226
	(604)	(604)	(604)	(604)	(604)	(604)	(603)
	P= .000	P= .000	P= .000	P= .420	P= .199	P= .025	P= .290
AA08	.3557	-.0351	-.0447	-.0306	-.0153	-.0238	-.0101
	(604)	(604)	(604)	(604)	(604)	(604)	(603)
	P= .000	P= .195	P= .136	P= .226	P= .354	P= .279	P= .402
AA09	.1462	-.0167	.0461	-.0440	.0632	-.0089	-.0169
	(604)	(604)	(604)	(604)	(604)	(604)	(603)
	P= .000	P= .341	P= .129	P= .140	P= .060	P= .414	P= .339
ACOL	.4927	.4689	.4202	.1943	.4542	.5305	.1858
	(604)	(604)	(604)	(604)	(604)	(604)	(603)
	P= .000	P= .000	P= .000	P= .000	P= .000	P= .000	P= .000
ANCOL	.8436	.1761	.0027	-.0059	.2191	.1814	-.0322
	(604)	(604)	(604)	(604)	(604)	(604)	(603)
	P= .000	P= .000	P= .474	P= .443	P= .000	P= .000	P= .215
AAA1	1.0000	.0912	-.0233	.0419	.3218	.2705	.0827
	(0)	(604)	(604)	(604)	(604)	(604)	(603)
	P= .	P= .013	P= .284	P= .152	P= .000	P= .000	P= .021
AAA2	.0912	1.0000	.0315	-.0091	-.0393	.0043	-.0243
	(604)	(0)	(604)	(604)	(604)	(604)	(603)
	P= .013	P= .	P= .220	P= .412	P= .168	P= .458	P= .275
AAA3	-.0233	.0315	1.0000	.0095	-.0035	.0880	-.0234
	(604)	(604)	(0)	(604)	(604)	(604)	(603)
	P= .284	P= .220	P= .	P= .408	P= .465	P= .015	P= .283
AAA4	.0419	-.0091	.0095	1.0000	-.0173	.0159	-.0119
	(604)	(604)	(604)	(0)	(604)	(604)	(603)
	P= .152	P= .412	P= .408	P= .	P= .335	P= .348	P= .386
AAA5	.3218	-.0393	-.0035	-.0173	1.0000	.8481	-.0030
	(604)	(604)	(604)	(604)	(0)	(604)	(603)
	P= .000	P= .168	P= .465	P= .335	P= .	P= .000	P= .471
AAA6	.2705	.0043	.0880	.0159	.8481	1.0000	-.0061
	(604)	(604)	(604)	(604)	(604)	(0)	(603)
	P= .000	P= .458	P= .015	P= .348	P= .000	P= .	P= .441
AAA7	.0827	-.0243	-.0234	-.0119	-.0030	-.0061	1.0000
	(603)	(603)	(603)	(603)	(603)	(603)	(0)
	P= .021	P= .275	P= .283	P= .386	P= .471	P= .441	P= .

O(COEFFICIENT / (CASES) / 1-TAILED SIG) " . " IS PRINTED IF A COEFFICIENT CANNOT BE CO

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22 APR 88 SPSS-X RELEASE 2.2 FOR IBM/MVS
16:44:26 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

OPRECEDING TASK REQUIRED 2.68 SECONDS CPU TIME; 18.00 SECONDS ELAPSED.

Appendix C9: Correlations - offences against accidents

22 APR 88   SPSS-X RELEASE 2.2 FOR IBM/MVS
16:46:22   **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - - - - - - - - - - - - - P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S - - - - - - - - - - - - - - - -
0

	AA01	AA02	AA03	AA04	AA05	AA06	AA07	AA08	AA09	ACOL	ANCOL
AD1	.3787	-.0039	-.0229	.0295	-.0472	.2941	-.0028	.0188	-.0558	.3313	.1088
	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)
	P= .000	P= .462	P= .289	P= .236	P= .126	P= .000	P= .473	P= .324	P= .088	P= .000	P= .004
AD2	.3519	.0463	-.0589	.0393	-.0764	.2131	-.1462	-.0846	-.1071	.3127	-.0685
	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)
	P= .000	P= .130	P= .076	P= .170	P= .032	P= .000	P= .000	P= .020	P= .005	P= .000	P= .048
AD3	.1399	.0769	-.0241	-.0126	-.0560	.1934	-.0146	-.0424	-.0704	.1211	.0334
	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)
	P= .000	P= .031	P= .279	P= .380	P= .087	P= .000	P= .361	P= .152	P= .043	P= .002	P= .208
AD4	-.0087	-.0045	-.0246	-.0181	-.0218	.0835	-.0375	.0035	-.0566	-.0187	-.0033
	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)
	P= .416	P= .456	P= .275	P= .330	P= .298	P= .021	P= .181	P= .467	P= .084	P= .325	P= .468
AD5	.1240	.0692	-.0315	.0925	-.0351	.0117	-.0307	.0020	-.0098	.1447	-.0299
	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)
	P= .001	P= .046	P= .222	P= .012	P= .197	P= .388	P= .227	P= .481	P= .405	P= .000	P= .234
AD6	.1117	-.0225	-.0063	.0136	-.0432	.0433	.0319	.0649	-.0201	.0969	.0451
	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)
	P= .003	P= .293	P= .440	P= .371	P= .147	P= .146	P= .219	P= .057	P= .313	P= .009	P= .137
AD7	-.0510	.0088	-.0029	.0012	.0255	-.0055	-.0146	.0886	-.0521	-.0426	-.0020
	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)
	P= .107	P= .415	P= .472	P= .489	P= .268	P= .447	P= .361	P= .015	P= .103	P= .150	P= .481
AD8	-.0700	-.0019	.0231	.0190	.0164	-.0478	.1010	.1216	-.0471	-.0494	.0996
	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)
	P= .044	P= .482	P= .287	P= .322	P= .345	P= .122	P= .007	P= .002	P= .126	P= .115	P= .008
AD9	.0074	-.0178	.0314	.0047	-.0327	-.0140	.0462	.1922	.0032	.0108	.0592
	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)
	P= .428	P= .333	P= .223	P= .454	P= .213	P= .367	P= .131	P= .000	P= .469	P= .396	P= .075
ACOMP	.1178	.0602	-.0269	.0284	-.0469	.1624	-.0792	-.0277	-.0609	.1150	-.0120
	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)
	P= .002	P= .071	P= .257	P= .245	P= .127	P= .000	P= .027	P= .250	P= .069	P= .003	P= .385
AVTOTDIS	.2651	.0444	-.0333	.0474	-.0576	.1956	-.0272	.0414	-.1082	.2452	.0500
	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)
	P= .000	P= .140	P= .209	P= .125	P= .081	P= .000	P= .254	P= .157	P= .004	P= .000	P= .112
AVLATE	.0981	.0033	.0094	.0904	.1325	.1446	-.0664	.0169	-.0321	.1131	.0061
	(388)	(388)	(388)	(388)	(388)	(388)	(388)	(388)	(388)	(388)	(388)
	P= .027	P= .474	P= .426	P= .038	P= .004	P= .002	P= .096	P= .370	P= .264	P= .013	P= .452
AVABS	-.0775	.0510	-.0168	.0464	.0460	-.0713	.0711	.0196	-.0089	-.0405	.0497
	(371)	(371)	(371)	(371)	(371)	(371)	(371)	(371)	(371)	(371)	(371)
	P= .068	P= .164	P= .373	P= .186	P= .189	P= .085	P= .086	P= .353	P= .432	P= .218	P= .170
SHORTS	-.1009	.0604	.0995	.0737	.0987	-.2515	.3023	.0866	.0957	-.0358	.2364
	(449)	(449)	(449)	(449)	(449)	(449)	(449)	(449)	(449)	(449)	(450)
	P= .016	P= .101	P= .017	P= .059	P= .018	P= .000	P= .000	P= .033	P= .021	P= .225	P= .000
AAD2	.2773	.0472	-.0420	.1005	-.0776	.1112	-.1572	-.0952	-.0838	.2744	-.1217
	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)
	P= .000	P= .125	P= .154	P= .007	P= .029	P= .003	P= .000	P= .010	P= .021	P= .000	P= .002
AAD3	-.0100	.0126	-.0076	.0142	-.0393	.0171	.0836	.1022	-.0707	-.0029	.0755
	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)
	P= .404	P= .380	P= .427	P= .365	P= .169	P= .339	P= .021	P= .006	P= .043	P= .472	P= .033
AAD4	.4498	-.0049	-.0192	.0044	.0132	.3851	-.0663	.0191	-.0454	.3832	.1314
	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)
	P= .000	P= .453	P= .320	P= .458	P= .374	P= .000	P= .053	P= .321	P= .135	P= .000	P= .001
AAD5	.0151	.0570	-.0196	.0257	.0174	.0362	-.0432	.0248	-.0332	.0267	-.0104
	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)
	P= .357	P= .083	P= .317	P= .266	P= .336	P= .190	P= .147	P= .273	P= .210	P= .258	P= .400
AAD6	.0732	.0080	-.0336	.0246	-.0108	.0609	-.0779	.0017	-.0578	.0676	-.0446
	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)
	P= .038	P= .423	P= .207	P= .275	P= .397	P= .069	P= .029	P= .483	P= .080	P= .050	P= .139
AAD7	.5553	-.0063	-.0115	-.0251	-.0165	.4884	-.0270	-.0189	-.0296	.4636	.1933
	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)
	P= .000	P= .439	P= .390	P= .271	P= .344	P= .000	P= .256	P= .323	P= .236	P= .000	P= .000
ACOMM	-.0250	-.0155	-.0144	-.0036	-.0425	.0275	-.0833	-.0425	-.0017	-.0270	-.0705
	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(593)
	P= .272	P= .353	P= .363	P= .465	P= .151	P= .252	P= .021	P= .151	P= .484	P= .256	P= .043

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Appendix C10: Correlations - offences against accidents (contd)

- - - - - - - - - - - - - - P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S - - - -

	AAA1	AAA2	AAA3	AAA4	AAA5	AAA6	AAA7
AD1	.1205	.1714	.1979	-.0285	.3929	.3856	-.0210
	(593)	(593)	(593)	(593)	(593)	(593)	(592)
	P= .002	P= .000	P= .000	P= .245	P= .000	P= .000	P= .305
AD2	-.0867	.2366	.1634	.1043	.2403	.3355	-.0260
	(593)	(593)	(593)	(593)	(593)	(593)	(592)
	P= .017	P= .000	P= .000	P= .006	P= .000	P= .000	P= .264
AD3	-.0343	.1759	.1503	.0091	-.0180	-.0023	-.0154
	(593)	(593)	(593)	(593)	(593)	(593)	(592)
	P= .202	P= .000	P= .000	P= .412	P= .331	P= .477	P= .354
AD4	-.0513	.0165	.0362	.0105	-.0167	.0079	-.0131
	(593)	(593)	(593)	(593)	(593)	(593)	(592)
	P= .106	P= .344	P= .190	P= .399	P= .343	P= .424	P= .375
AD5	-.0445	.1164	.1823	.0306	-.0326	.0576	-.0245
	(593)	(593)	(593)	(593)	(593)	(593)	(592)
	P= .140	P= .002	P= .000	P= .229	P= .214	P= .081	P= .276
AD6	.0138	.2173	.0243	.0107	-.0159	-.0090	-.0105
	(593)	(593)	(593)	(593)	(593)	(593)	(592)
	P= .369	P= .000	P= .278	P= .397	P= .349	P= .413	P= .399
AD7	-.0189	-.1019	.0871	-.0407	-.0143	.0072	-.0127
	(593)	(593)	(593)	(593)	(593)	(593)	(592)
	P= .323	P= .007	P= .017	P= .161	P= .364	P= .431	P= .379
AD8	.0927	-.1220	.0645	-.0554	-.0058	-.0367	-.0171
	(593)	(593)	(593)	(593)	(593)	(593)	(592)
	P= .012	P= .001	P= .058	P= .089	P= .444	P= .186	P= .339
AD9	.0509	-.0132	.0034	-.0112	-.0105	.0008	-.0069
	(593)	(593)	(593)	(593)	(593)	(593)	(592)
	P= .108	P= .375	P= .467	P= .393	P= .399	P= .492	P= .433
ACOMP	-.0641	.1535	.1539	-.0068	-.0266	.0309	-.0175
	(593)	(593)	(593)	(593)	(593)	(593)	(592)
	P= .059	P= .000	P= .000	P= .434	P= .259	P= .226	P= .335
AVTOTDIS	.0160	.1496	.2316	.0135	.1825	.2337	-.0356
	(593)	(593)	(593)	(593)	(593)	(593)	(592)
	P= .348	P= .000	P= .000	P= .371	P= .000	P= .000	P= .194
AVLATE	-.0310	.1024	.0993	.1689	.0914	.0794	.0089
	(388)	(388)	(388)	(388)	(388)	(388)	(388)
	P= .271	P= .022	P= .025	P= .000	P= .036	P= .059	P= .431
AVABS	.0679	-.0022	-.1038	-.0403	-.0431	-.1510	-.0079
	(371)	(371)	(371)	(371)	(371)	(371)	(371)
	P= .096	P= .483	P= .023	P= .219	P= .204	P= .002	P= .440
SHORTS	.2480	.0194	-.0910	-.1533	.0634	-.1768	-.0066
	(449)	(449)	(449)	(449)	(449)	(449)	(449)
	P= .000	P= .341	P= .027	P= .001	P= .090	P= .000	P= .445
AAD2	-.1681	.3858	.2279	.1085	-.0314	.0735	-.0196
	(593)	(593)	(593)	(593)	(593)	(593)	(592)
	P= .000	P= .000	P= .000	P= .004	P= .223	P= .037	P= .317
AAD3	.0251	-.0037	.1431	-.0463	-.0258	-.0348	-.0307
	(593)	(593)	(593)	(593)	(593)	(593)	(592)
	P= .271	P= .464	P= .000	P= .130	P= .266	P= .199	P= .228
AAD4	.1909	.0152	.1073	.0479	.6092	.6421	-.0120
	(593)	(593)	(593)	(593)	(593)	(593)	(592)
	P= .000	P= .356	P= .004	P= .122	P= .000	P= .000	P= .386
AAD5	-.0070	-.0575	.1247	-.0271	-.0077	.0254	-.0087
	(593)	(593)	(593)	(593)	(593)	(593)	(592)
	P= .433	P= .081	P= .001	P= .255	P= .426	P= .269	P= .416
AAD6	-.0821	.0423	.1258	.0111	-.0167	.1058	-.0151
	(593)	(593)	(593)	(593)	(593)	(593)	(592)
	P= .023	P= .152	P= .001	P= .393	P= .342	P= .005	P= .357
AAD7	.3297	-.0387	-.0035	-.0196	.8777	.8349	-.0038
	(593)	(593)	(593)	(593)	(593)	(593)	(592)
	P= .000	P= .173	P= .466	P= .317	P= .000	P= .000	P= .463
ACOMM	-.0853	-.0083	-.0158	.0151	-.0149	.0293	.0067
	(593)	(593)	(593)	(593)	(593)	(593)	(592)
	P= .019	P= .420	P= .351	P= .356	P= .359	P= .238	P= .435

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Appendix C11: Correlations - predictors against criteria

22 APR 88 SPSS-X RELEASE 2.2 FOR IBM/MVS
16:55:06 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

0- - - - - - - - - - - - - - PEARSON CORRELATION COEFFICIENTS - - - - - - - - - - - - - -
0

	AD1	AD2	AD3	AD4	AD5	AD6	AD7	AD8	AD9	ACOMP	AVTOTDIS
AGE	-.1586 (587) P= .000	-.0657 (587) P= .056	-.1106 (587) P= .004	-.0055 (587) P= .447	-.0928 (587) P= .012	-.0354 (587) P= .196	-.1201 (587) P= .002	-.1128 (587) P= .003	-.0507 (587) P= .110	-.1018 (587) P= .007	-.1802 (587) P= .000
SERVICE	-.1609 (594) P= .000	-.1636 (594) P= .000	-.1437 (594) P= .000	-.0555 (594) P= .088	-.0493 (594) P= .115	-.0683 (594) P= .048	-.0548 (594) P= .091	-.0749 (594) P= .034	-.0730 (594) P= .038	-.1309 (594) P= .001	-.2005 (594) P= .000
JOINAGE	-.0615 (587) P= .068	.0616 (587) P= .068	-.0164 (587) P= .346	.0346 (587) P= .201	-.0705 (587) P= .044	.0074 (587) P= .429	-.1001 (587) P= .008	-.0749 (587) P= .035	-.0021 (587) P= .480	-.0164 (587) P= .346	-.0524 (587) P= .102
CARLIC	-.1235 (360) P= .010	.0261 (360) P= .311	-.0809 (360) P= .063	-.0446 (360) P= .199	-.1463 (360) P= .003	-.0616 (360) P= .122	-.1092 (360) P= .019	-.1094 (360) P= .019	-.0671 (360) P= .102	-.0879 (360) P= .048	-.1490 (360) P= .002
PREVJOBS	-.0066 (402) P= .448	.0004 (402) P= .497	.0278 (402) P= .289	.0178 (402) P= .361	.1358 (402) P= .003	.0552 (402) P= .135	.1386 (402) P= .003	.0772 (402) P= .061	.0223 (402) P= .328	.0775 (402) P= .060	.0928 (402) P= .031
DEPSIZE	.2070 (594) P= .000	.3567 (594) P= .000	.2449 (594) P= .000	.1957 (594) P= .000	.1290 (594) P= .001	.0945 (594) P= .011	.0871 (594) P= .017	-.0138 (594) P= .368	.0463 (594) P= .130	.2396 (594) P= .000	.3097 (594) P= .000
DISTHQ	-.1358 (594) P= .000	-.1401 (594) P= .000	-.1498 (594) P= .000	-.0953 (594) P= .010	-.0242 (594) P= .278	-.0461 (594) P= .131	-.1010 (594) P= .007	-.1128 (594) P= .003	-.0545 (594) P= .092	-.1380 (594) P= .000	-.2051 (594) P= .000
WRTRIGHT	.0604 (592) P= .071	.1027 (592) P= .006	.0368 (592) P= .185	-.0515 (592) P= .105	.0492 (592) P= .116	.0302 (592) P= .231	.0123 (592) P= .382	.0240 (592) P= .280	.0209 (592) P= .306	.0569 (592) P= .083	.0832 (592) P= .021
WRTWRONG	.0435 (592) P= .146	.0961 (592) P= .010	.1058 (592) P= .005	-.0335 (592) P= .208	.0534 (592) P= .097	.0506 (592) P= .110	-.0293 (592) P= .238	-.0379 (592) P= .179	-.0016 (592) P= .485	.0330 (592) P= .211	.0612 (592) P= .068
CFTOTAL	.1147 (593) P= .003	.0654 (593) P= .056	.0510 (593) P= .108	.0398 (593) P= .166	.0341 (593) P= .204	.0320 (593) P= .218	.0664 (593) P= .053	.0701 (593) P= .044	.0277 (593) P= .250	.0359 (593) P= .191	.1212 (593) P= .002
SPFA	-.0245 (571) P= .280	-.0069 (571) P= .434	-.0003 (571) P= .497	-.0995 (571) P= .009	.0100 (571) P= .406	.0413 (571) P= .162	.0080 (571) P= .425	.0411 (571) P= .163	.0712 (571) P= .045	-.0505 (571) P= .114	.0059 (571) P= .444
SPFB	.0846 (571) P= .022	.0318 (571) P= .224	-.0129 (571) P= .379	.0577 (571) P= .084	-.0063 (571) P= .440	.0249 (571) P= .277	-.0446 (571) P= .144	-.0590 (571) P= .080	.0192 (571) P= .324	.0171 (571) P= .342	.0094 (571) P= .412
SPFC	.0128 (571) P= .380	.0589 (571) P= .080	.0149 (571) P= .361	-.0420 (571) P= .158	-.0448 (571) P= .142	-.0495 (571) P= .119	-.0021 (571) P= .480	-.0112 (571) P= .395	.0377 (571) P= .184	.0287 (571) P= .247	.0085 (571) P= .420
SPFE	.0681 (571) P= .052	.0183 (571) P= .331	-.0280 (571) P= .252	.1447 (571) P= .000	.0963 (571) P= .011	.0445 (571) P= .144	.1082 (571) P= .005	.0949 (571) P= .012	.0740 (571) P= .039	.0247 (571) P= .278	.1190 (571) P= .002
SPFF	.0267 (571) P= .262	.0652 (571) P= .060	.0092 (571) P= .413	-.0032 (571) P= .470	.0779 (571) P= .031	-.0327 (571) P= .217	.0525 (571) P= .105	.1148 (571) P= .003	.0932 (571) P= .013	.0373 (571) P= .187	.1083 (571) P= .005
SPFG	-.0395 (571) P= .173	-.0414 (571) P= .162	-.0888 (571) P= .017	-.0089 (571) P= .416	-.0804 (571) P= .027	.0304 (571) P= .234	-.0754 (571) P= .036	-.0464 (571) P= .134	-.0397 (571) P= .172	-.0685 (571) P= .051	-.0927 (571) P= .013
SPFH	.0658 (571) P= .058	.0493 (571) P= .120	.0106 (571) P= .400	.0512 (571) P= .111	.0952 (571) P= .011	-.0141 (571) P= .368	.0714 (571) P= .044	.1015 (571) P= .008	.0754 (571) P= .036	.0294 (571) P= .242	.1205 (571) P= .002
SPFI	-.0070 (571) P= .434	-.0262 (571) P= .266	.0337 (571) P= .211	.0023 (571) P= .478	.0420 (571) P= .158	.1400 (571) P= .000	-.0450 (571) P= .142	-.0407 (571) P= .166	-.0269 (571) P= .260	.0232 (571) P= .290	-.0113 (571) P= .393
SPFL	.0200 (571) P= .317	-.0293 (571) P= .242	.0360 (571) P= .195	.0711 (571) P= .045	.0288 (571) P= .246	.0823 (571) P= .025	.0458 (571) P= .138	.0434 (571) P= .150	-.0557 (571) P= .092	.0678 (571) P= .053	.0438 (571) P= .148
SPFM	-.0051 (571) P= .452	.0759 (571) P= .035	.0229 (571) P= .293	-.0116 (571) P= .391	.0757 (571) P= .035	.0614 (571) P= .071	-.0292 (571) P= .243	-.0937 (571) P= .013	.0723 (571) P= .042	.0869 (571) P= .019	.0110 (571) P= .396
SPFN	-.0760 (571) P= .035	-.0828 (571) P= .024	-.0316 (571) P= .225	-.0054 (571) P= .449	-.0714 (571) P= .044	-.0140 (571) P= .369	-.0731 (571) P= .041	-.0435 (571) P= .150	-.0784 (571) P= .031	-.0604 (571) P= .075	-.1085 (571) P= .005
SPFO	-.0542 (571) P= .098	-.0435 (571) P= .150	-.0057 (571) P= .446	.0138 (571) P= .371	.0004 (571) P= .496	.0280 (571) P= .253	-.0585 (571) P= .081	-.0027 (571) P= .474	-.0864 (571) P= .020	-.0135 (571) P= .374	-.0428 (571) P= .153
SPFQ1	.1000 (571) P= .008	.0223 (571) P= .297	.0487 (571) P= .123	.0127 (571) P= .381	.0185 (571) P= .330	.0150 (571) P= .361	.0896 (571) P= .016	.0821 (571) P= .025	.0206 (571) P= .312	.1006 (571) P= .008	.1009 (571) P= .008
SPFQ2	-.0269 (571) P= .261	.0073 (571) P= .431	-.0080 (571) P= .425	-.0004 (571) P= .496	-.0861 (571) P= .020	.0161 (571) P= .350	-.0202 (571) P= .315	-.0805 (571) P= .027	-.0765 (571) P= .034	-.0214 (571) P= .305	-.0630 (571) P= .066
SPFQ3	-.0970 (571) P= .010	-.0375 (571) P= .186	-.0624 (571) P= .068	-.0923 (571) P= .014	-.0649 (571) P= .061	-.0243 (571) P= .281	-.0447 (571) P= .143	-.0809 (571) P= .027	-.0061 (571) P= .442	-.0436 (571) P= .149	-.1203 (571) P= .002
SPFQ4	.0195 (571) P= .321	-.0431 (571) P= .152	-.0185 (571) P= .329	.0799 (571) P= .028	.1018 (571) P= .007	.0512 (571) P= .111	.0283 (571) P= .250	.0300 (571) P= .237	.0149 (571) P= .362	.0390 (571) P= .176	.0362 (571) P= .194

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22 APR 88 SPSS-X RELEASE 2.2 FOR IBM/MVS PAGE
16:55:08 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (VSS)

- - - - - - - - - - - - - - - P E A R S O N C O R R E L A T I O N C O E F F I C I E N T S - - - - - - - - - - - - - - -

	AVLATE	AVABS	SHORTS	AAD2	AAD3	AAD4	AAD5	AAD6	AAD7	ACOMM	AA01
AGE	-.2005	-.2099	-.1053	-.1048	-.1496	-.0931	-.0532	-.0577	-.0594	.1229	-.1147
	(385)	(369)	(447)	(587)	(587)	(587)	(587)	(587)	(587)	(587)	(595)
	P= .000	P= .000	P= .013	P= .006	P= .000	P= .012	P= .099	P= .081	P= .075	P= .001	P= .003
SERVICE	-.2380	-.1711	-.1673	-.1906	-.1228	-.0869	-.0359	-.0902	-.0499	.2157	-.2032
	(389)	(372)	(451)	(594)	(594)	(594)	(594)	(594)	(594)	(594)	(604)
	P= .000	P= .000	P= .000	P= .000	P= .001	P= .017	P= .191	P= .014	P= .112	P= .000	P= .000
JOINAGE	-.0478	-.1200	.0111	.0325	-.0788	-.0414	-.0349	.0038	-.0309	-.0235	.0267
	(385)	(369)	(447)	(587)	(587)	(587)	(587)	(587)	(587)	(587)	(595)
	P= .175	P= .011	P= .407	P= .216	P= .028	P= .158	P= .199	P= .463	P= .228	P= .285	P= .258
CARLIC	-.0687	-.1861	-.0153	-.0159	-.1575	-.0897	-.0827	-.0539	-.0346	-.0015	-.0199
	(252)	(243)	(263)	(360)	(360)	(360)	(360)	(360)	(360)	(360)	(367)
	P= .139	P= .002	P= .402	P= .382	P= .001	P= .045	P= .059	P= .154	P= .256	P= .489	P= .352
PREVJOBS	.0693	.0200	.0129	.0405	.0755	.0525	.0809	.0603	-.0244	.0603	-.0526
	(282)	(266)	(301)	(402)	(402)	(402)	(402)	(402)	(402)	(402)	(410)
	P= .123	P= .373	P= .412	P= .209	P= .065	P= .147	P= .053	P= .114	P= .313	P= .114	P= .144
DEPSIZE	.2569	-.0163	-.2401	.4309	.1167	.1772	.0391	.2090	-.0150	.2133	.1412
	(389)	(372)	(451)	(594)	(594)	(594)	(594)	(594)	(594)	(594)	(604)
	P= .000	P= .377	P= .000	P= .000	P= .002	P= .000	P= .171	P= .000	P= .358	P= .000	P= .000
DISTHQ	-.1841	-.1403	.1758	-.2023	-.1139	-.1177	-.0576	-.1232	-.0276	-.1107	-.1186
	(389)	(372)	(451)	(594)	(594)	(594)	(594)	(594)	(594)	(594)	(604)
	P= .000	P= .003	P= .000	P= .000	P= .003	P= .002	P= .081	P= .001	P= .251	P= .003	P= .002
WRTRIGHT	.1584	.0146	-.1568	.1252	.0373	.0142	.0037	.0366	.0414	.0376	.0999
	(388)	(372)	(450)	(592)	(592)	(592)	(592)	(592)	(592)	(592)	(602)
	P= .001	P= .390	P= .000	P= .001	P= .183	P= .365	P= .464	P= .187	P= .157	P= .181	P= .007
WRTWRONG	-.0278	-.0352	-.0047	.0631	.0377	.0224	-.0164	.0521	.0043	.0640	.0725
	(388)	(372)	(450)	(592)	(592)	(592)	(592)	(592)	(592)	(592)	(602)
	P= .292	P= .249	P= .461	P= .063	P= .180	P= .293	P= .345	P= .103	P= .458	P= .060	P= .038
CFTOTAL	.0834	.0676	-.1394	.0891	.0788	.0639	.0689	.0729	.0393	-.0044	.0641
	(388)	(371)	(450)	(593)	(593)	(593)	(593)	(593)	(593)	(593)	(603)
	P= .050	P= .097	P= .002	P= .015	P= .028	P= .060	P= .047	P= .038	P= .170	P= .457	P= .058
SPFA	.0452	-.0111	.0833	-.0240	.0254	.0031	.0092	-.0104	-.0095	.0022	-.0394
	(381)	(365)	(436)	(571)	(571)	(571)	(571)	(571)	(571)	(571)	(581)
	P= .189	P= .417	P= .041	P= .284	P= .272	P= .471	P= .413	P= .402	P= .410	P= .479	P= .171
SPFB	.0339	-.0707	-.1480	.0473	-.0338	.0377	.0073	.0371	.0431	.0451	.0610
	(381)	(365)	(436)	(571)	(571)	(571)	(571)	(571)	(571)	(571)	(581)
	P= .254	P= .089	P= .001	P= .130	P= .210	P= .184	P= .431	P= .188	P= .152	P= .141	P= .071
SPFC	.0613	-.0123	-.0588	.0215	-.0036	.0063	-.0001	-.0027	.0563	-.0082	.0422
	(381)	(365)	(436)	(571)	(571)	(571)	(571)	(571)	(571)	(571)	(581)
	P= .116	P= .407	P= .110	P= .304	P= .466	P= .440	P= .500	P= .474	P= .089	P= .422	P= .155
SPFE	.1047	.1254	.0289	.0244	.1016	.0574	.0752	.0996	.0379	-.0065	.0193
	(381)	(365)	(436)	(571)	(571)	(571)	(571)	(571)	(571)	(571)	(581)
	P= .021	P= .008	P= .274	P= .281	P= .008	P= .085	P= .036	P= .009	P= .183	P= .438	P= .321
SPFF	.1250	.1580	.0761	.0763	.0642	.1068	.0079	.0489	.0563	-.0495	.0776
	(381)	(365)	(436)	(571)	(571)	(571)	(571)	(571)	(571)	(571)	(581)
	P= .007	P= .001	P= .056	P= .034	P= .063	P= .005	P= .425	P= .122	P= .090	P= .119	P= .031
SPFG	-.0785	-.1431	-.1111	.0011	-.1115	-.0364	-.0051	-.0688	.0239	.0391	-.0547
	(381)	(365)	(436)	(571)	(571)	(571)	(571)	(571)	(571)	(571)	(581)
	P= .063	P= .003	P= .010	P= .489	P= .004	P= .193	P= .451	P= .050	P= .285	P= .175	P= .094
SPFH	.0932	.0924	.0226	.0439	.0736	.1030	.0711	.0715	.1096	.0267	.0579
	(381)	(365)	(436)	(571)	(571)	(571)	(571)	(571)	(571)	(571)	(581)
	P= .035	P= .039	P= .319	P= .147	P= .039	P= .007	P= .045	P= .044	P= .004	P= .262	P= .082
SPFI	.0017	-.0313	-.0072	.0570	-.0436	.0040	-.0395	.0869	-.0999	.0810	.0088
	(381)	(365)	(436)	(571)	(571)	(571)	(571)	(571)	(571)	(571)	(581)
	P= .487	P= .276	P= .441	P= .087	P= .149	P= .462	P= .173	P= .019	P= .008	P= .027	P= .416
SPFL	.0297	.0090	.1167	-.0313	.0942	-.0519	-.0279	.0109	-.0603	-.0217	-.0646
	(381)	(365)	(436)	(571)	(571)	(571)	(571)	(571)	(571)	(571)	(581)
	P= .282	P= .432	P= .007	P= .228	P= .012	P= .108	P= .253	P= .398	P= .075	P= .302	P= .060
SPFM	.0259	.0165	-.0264	.0854	-.0350	.0014	-.0169	.0943	-.0322	.0658	.0734
	(381)	(365)	(436)	(571)	(571)	(571)	(571)	(571)	(571)	(571)	(581)
	P= .307	P= .377	P= .291	P= .021	P= .202	P= .487	P= .344	P= .012	P= .221	P= .058	P= .038
SPFN	-.0423	-.0016	.0466	-.0856	-.0668	-.0525	-.0647	-.1063	-.0464	.0851	-.0922
	(381)	(365)	(436)	(571)	(571)	(571)	(571)	(571)	(571)	(571)	(581)
	P= .205	P= .488	P= .166	P= .020	P= .055	P= .105	P= .061	P= .006	P= .134	P= .021	P= .013
SPFO	-.0304	-.0549	-.0030	-.0159	-.0131	-.0458	-.0080	-.0395	-.0923	.0317	-.0730
	(381)	(365)	(436)	(571)	(571)	(571)	(571)	(571)	(571)	(571)	(581)
	P= .277	P= .148	P= .475	P= .353	P= .377	P= .137	P= .424	P= .173	P= .014	P= .225	P= .039
SPFQ1	.1113	.0955	.0664	.0238	.1062	.0548	.0074	-.0157	.0437	-.0844	.0729
	(381)	(365)	(436)	(571)	(571)	(571)	(571)	(571)	(571)	(571)	(581)
	P= .015	P= .034	P= .083	P= .285	P= .006	P= .096	P= .430	P= .354	P= .149	P= .022	P= .040
SPFQ2	-.0533	-.0217	.0030	-.0188	-.0213	-.1224	-.0453	-.0706	-.0909	.0411	-.0472
	(381)	(365)	(436)	(571)	(571)	(571)	(571)	(571)	(571)	(571)	(581)
	P= .150	P= .340	P= .475	P= .327	P= .306	P= .002	P= .140	P= .046	P= .015	P= .164	P= .128
SPFQ3	-.0522	-.0683	-.0956	-.0821	-.0922	-.0593	.0009	-.0826	.0045	.0177	-.0354
	(381)	(365)	(436)	(571)	(571)	(571)	(571)	(571)	(571)	(571)	(581)
	P= .155	P= .096	P= .023	P= .025	P= .014	P= .078	P= .491	P= .024	P= .457	P= .337	P= .197
SPFQ4	.0069	.0386	.0682	.0023	.0584	-.0327	-.0110	.0377	-.0527	-.0001	-.0452
	(381)	(365)	(436)	(571)	(571)	(571)	(571)	(571)	(571)	(571)	(581)
	P= .447	P= .231	P= .077	P= .478	P= .082	P= .217	P= .396	P= .184	P= .104	P= .499	P= .138

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- - - - - - - - - - - - - - P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S - - - - - - - - - - - - - -

	AA02	AA03	AA04	AA05	AA06	AA07	AA08	AA09	ACOL	ANCOL	AAA1
AGE	.0011	-.0360	-.1426	-.0792	-.1164	-.1094	-.0406	.0486	-.1568	-.1039	-.1518
	(595)	(595)	(595)	(595)	(595)	(595)	(595)	(595)	(595)	(601)	(595)
	P= .489	P= .191	P= .000	P= .027	P= .002	P= .004	P= .161	P= .118	P= .000	P= .005	P= .000
SERVICE	-.0475	-.0689	-.1397	-.0901	-.1114	-.1263	-.0755	.0420	-.2423	-.1255	-.1826
	(604)	(604)	(604)	(604)	(604)	(604)	(604)	(604)	(604)	(607)	(604)
	P= .122	P= .045	P= .000	P= .013	P= .003	P= .001	P= .032	P= .151	P= .000	P= .001	P= .000
JOINAGE	.0404	.0130	-.0563	-.0217	-.0510	-.0280	.0129	.0241	.0089	-.0194	-.0323
	(595)	(595)	(595)	(595)	(595)	(595)	(595)	(595)	(595)	(598)	(595)
	P= .163	P= .376	P= .085	P= .299	P= .107	P= .248	P= .377	P= .279	P= .414	P= .318	P= .216
CARLIC	.0337	.0439	-.1141	-.0139	-.0790	-.0590	.0140	.0816	-.0478	-.0281	-.0406
	(367)	(367)	(367)	(367)	(367)	(367)	(367)	(367)	(367)	(368)	(367)
	P= .260	P= .201	P= .014	P= .395	P= .065	P= .130	P= .395	P= .059	P= .180	P= .296	P= .219
PREVJOBS	-.1034	-.0070	.0591	-.0325	-.0259	-.0218	.0421	-.1174	-.0372	-.0050	-.0299
	(410)	(410)	(410)	(410)	(410)	(410)	(410)	(410)	(410)	(411)	(410)
	P= .018	P= .444	P= .116	P= .256	P= .301	P= .330	P= .198	P= .009	P= .226	P= .460	P= .273
DEPSIZE	.0779	.0063	.0302	-.0433	.1011	.1520	.0433	-.2019	.1427	-.0278	.0137
	(604)	(604)	(604)	(604)	(604)	(604)	(604)	(604)	(604)	(612)	(604)
	P= .028	P= .439	P= .229	P= .144	P= .006	P= .000	P= .144	P= .000	P= .000	P= .246	P= .368
DISTHQ	-.0471	-.0355	.0005	-.0235	-.1124	-.2133	-.0778	.2923	-.1125	-.0657	-.1182
	(604)	(604)	(604)	(604)	(604)	(604)	(604)	(604)	(604)	(612)	(604)
	P= .124	P= .192	P= .495	P= .283	P= .003	P= .000	P= .028	P= .000	P= .003	P= .052	P= .002
WRTRIGHT	-.0068	.0388	.1238	.0223	.0654	-.0294	.0126	.0154	.1366	.0104	.0225
	(602)	(602)	(602)	(602)	(602)	(602)	(602)	(602)	(602)	(610)	(602)
	P= .434	P= .171	P= .001	P= .293	P= .054	P= .236	P= .379	P= .354	P= .000	P= .398	P= .290
WRTWRONG	.0632	.0433	.0466	.0157	.0102	.0125	-.0541	-.0164	.0941	-.0263	.0084
	(602)	(602)	(602)	(602)	(602)	(602)	(602)	(602)	(602)	(610)	(602)
	P= .061	P= .144	P= .127	P= .350	P= .401	P= .380	P= .093	P= .344	P= .010	P= .258	P= .418
CFTOTAL	-.0360	.0381	.0927	.0457	.0972	-.0558	.0051	-.0008	.0907	.0147	.0014
	(603)	(603)	(603)	(603)	(603)	(603)	(603)	(603)	(603)	(611)	(603)
	P= .189	P= .175	P= .011	P= .131	P= .009	P= .086	P= .451	P= .492	P= .013	P= .358	P= .486
SPFA	-.0055	.0118	-.0102	.0510	-.0266	-.0250	-.0626	.0128	-.0363	-.0221	-.0132
	(581)	(581)	(581)	(581)	(581)	(581)	(581)	(581)	(581)	(589)	(581)
	P= .447	P= .389	P= .403	P= .110	P= .261	P= .274	P= .066	P= .379	P= .191	P= .296	P= .376
SPFB	-.0142	-.0007	.0896	-.0249	.0801	.0061	-.0195	-.0029	.0832	-.0186	-.0121
	(581)	(581)	(581)	(581)	(581)	(581)	(581)	(581)	(581)	(589)	(581)
	P= .367	P= .493	P= .015	P= .275	P= .027	P= .442	P= .320	P= .473	P= .022	P= .326	P= .386
SPFC	-.0010	.0085	-.0335	-.0309	.0604	-.0656	-.0106	.0460	.0248	-.0064	.0071
	(581)	(581)	(581)	(581)	(581)	(581)	(581)	(581)	(581)	(589)	(581)
	P= .490	P= .419	P= .210	P= .229	P= .073	P= .057	P= .400	P= .134	P= .276	P= .438	P= .433
SPFE	.0342	.0370	.0566	.0060	-.0160	.0555	.0586	-.0601	.0475	.0979	.0741
	(581)	(581)	(581)	(581)	(581)	(581)	(581)	(581)	(581)	(589)	(581)
	P= .206	P= .187	P= .087	P= .442	P= .350	P= .091	P= .079	P= .074	P= .126	P= .009	P= .037
SPFF	.0244	.0773	.1017	.0054	.0360	-.0154	-.0476	-.0415	.1190	.0197	.0765
	(581)	(581)	(581)	(581)	(581)	(581)	(581)	(581)	(581)	(589)	(581)
	P= .278	P= .031	P= .007	P= .448	P= .193	P= .356	P= .126	P= .159	P= .002	P= .317	P= .033
SPFG	-.0948	-.0620	-.0278	-.0132	.0311	-.1134	-.0455	.0286	-.0788	-.0349	-.0584
	(581)	(581)	(581)	(581)	(581)	(581)	(581)	(581)	(581)	(589)	(581)
	P= .011	P= .068	P= .252	P= .375	P= .227	P= .003	P= .137	P= .246	P= .029	P= .199	P= .080
SPFH	.0251	.0009	.0516	.0340	.0565	-.0062	-.0538	-.0112	.0718	.0876	.0689
	(581)	(581)	(581)	(581)	(581)	(581)	(581)	(581)	(581)	(589)	(581)
	P= .273	P= .492	P= .107	P= .207	P= .087	P= .441	P= .098	P= .394	P= .042	P= .017	P= .049
SPFI	-.0416	-.0455	-.0298	.0427	-.0070	.0484	-.0143	.0408	-.0159	-.0228	.0531
	(581)	(581)	(581)	(581)	(581)	(581)	(581)	(581)	(581)	(589)	(581)
	P= .158	P= .137	P= .237	P= .152	P= .433	P= .122	P= .365	P= .163	P= .351	P= .290	P= .101
SPFL	-.0275	-.0084	-.0251	-.0282	-.0594	.0107	-.0556	-.0508	-.0692	.0207	-.0287
	(581)	(581)	(581)	(581)	(581)	(581)	(581)	(581)	(581)	(589)	(581)
	P= .254	P= .420	P= .273	P= .249	P= .076	P= .399	P= .090	P= .111	P= .048	P= .308	P= .245
SPFM	.0165	.0267	.0967	.0270	.0478	-.0050	.0533	.0978	.1046	.0065	.0586
	(581)	(581)	(581)	(581)	(581)	(581)	(581)	(581)	(581)	(589)	(581)
	P= .346	P= .261	P= .010	P= .258	P= .125	P= .452	P= .100	P= .009	P= .006	P= .437	P= .079
SPFN	-.0469	-.0544	-.1090	-.0160	-.0805	-.0341	-.0187	.0631	-.1335	.0252	-.0846
	(581)	(581)	(581)	(581)	(581)	(581)	(581)	(581)	(581)	(589)	(581)
	P= .130	P= .095	P= .004	P= .350	P= .026	P= .206	P= .326	P= .064	P= .001	P= .271	P= .021
SPFO	.0098	.0136	-.0522	-.0362	-.0582	.0062	-.0077	-.0446	-.0782	-.0654	-.0761
	(581)	(581)	(581)	(581)	(581)	(581)	(581)	(581)	(581)	(589)	(581)
	P= .407	P= .372	P= .105	P= .192	P= .080	P= .441	P= .427	P= .142	P= .030	P= .056	P= .033
SPFQ1	.0504	.1251	.0663	-.0030	.0022	.0796	-.0579	-.0715	.1127	.0416	.0658
	(581)	(581)	(581)	(581)	(581)	(581)	(581)	(581)	(581)	(589)	(581)
	P= .113	P= .001	P= .055	P= .471	P= .479	P= .028	P= .082	P= .043	P= .003	P= .157	P= .057
SPFQ2	-.0179	.0376	.0243	-.0675	-.0082	.0075	.0080	.0178	-.0277	-.1050	-.0291
	(581)	(581)	(581)	(581)	(581)	(581)	(581)	(581)	(581)	(589)	(581)
	P= .333	P= .183	P= .280	P= .052	P= .422	P= .429	P= .424	P= .334	P= .253	P= .005	P= .242
SPFQ3	-.0672	-.0030	-.0153	.0032	.0203	-.0618	-.0192	.0131	-.0449	-.0038	-.0324
	(581)	(581)	(581)	(581)	(581)	(581)	(581)	(581)	(581)	(589)	(581)
	P= .053	P= .471	P= .357	P= .469	P= .313	P= .068	P= .322	P= .376	P= .140	P= .464	P= .218
SPFQ4	.0086	-.0140	.0366	.0153	-.0263	.0322	-.0135	-.0176	-.0261	-.0188	-.0103
	(581)	(581)	(581)	(581)	(581)	(581)	(581)	(581)	(581)	(589)	(581)
	P= .418	P= .369	P= .189	P= .357	P= .263	P= .220	P= .373	P= .336	P= .265	P= .324	P= .402

)(COEFFICIENT / (CASES) / 1-TAILED SIG) " . " IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED

<u>Appendix C14</u>: Correlations - predictors against criteria (contd)

22 APR 88 SPSS-X RELEASE 2.2 FOR IBM/MVS
16:55:10 **E.R.C.C. EMAS-A AMDAHL V7** AMDAHL V7 000001 EMAS-3 (V6S)

0- - - - - - - - - - - - - - P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S - - - - - - -
0

	AAA2	AAA3	AAA4	AAA5	AAA6	AAA7
AGE	-.1331	-.0582	-.0186	-.0779	-.0675	.0080
	(595)	(595)	(595)	(595)	(595)	(594)
	P= .001	P= .078	P= .325	P= .029	P= .050	P= .423
SERVICE	-.1605	-.1659	-.0877	-.0602	-.0590	-.0369
	(604)	(604)	(604)	(604)	(604)	(603)
	P= .000	P= .000	P= .016	P= .070	P= .074	P= .183
JOINAGE	-.0282	.0600	.0527	-.0448	-.0348	.0398
	(595)	(595)	(595)	(595)	(595)	(594)
	P= .246	P= .072	P= .100	P= .138	P= .198	P= .167
CARLIC	-.1057	.0177	.0359	-.0313	-.0707	.0691
	(367)	(367)	(367)	(367)	(367)	(367)
	P= .022	P= .368	P= .247	P= .275	P= .088	P= .093
PREVJOBS	.0124	-.0110	-.0462	-.0388	-.0608	-.0541
	(410)	(410)	(410)	(410)	(410)	(410)
	P= .401	P= .412	P= .175	P= .217	P= .109	P= .137
DEPSIZE	.2611	.0606	.0842	-.0067	.0836	-.0048
	(604)	(604)	(604)	(604)	(604)	(603)
	P= .000	P= .068	P= .019	P= .435	P= .020	P= .453
DISTHQ	-.1430	-.0140	-.0360	-.0308	-.0791	-.0210
	(604)	(604)	(604)	(604)	(604)	(603)
	P= .000	P= .366	P= .189	P= .225	P= .026	P= .304
WRTRIGHT	.0876	.1256	.0375	.0383	.0857	.0305
	(602)	(602)	(602)	(602)	(602)	(601)
	P= .016	P= .001	P= .179	P= .174	P= .018	P= .228
WRTWRONG	.0721	.0402	.0272	.0247	.0654	-.0014
	(602)	(602)	(602)	(602)	(602)	(601)
	P= .039	P= .162	P= .253	P= .273	P= .055	P= .487
CFTOTAL	.0531	.1021	.0816	.0146	.0270	-.0249
	(603)	(603)	(603)	(603)	(603)	(602)
	P= .096	P= .006	P= .023	P= .360	P= .254	P= .271
SPFA	-.0010	-.0435	-.0206	-.0201	-.0373	.0042
	(581)	(581)	(581)	(581)	(581)	(580)
	P= .491	P= .148	P= .310	P= .314	P= .185	P= .460
SPFB	.0760	.0798	.0289	.0124	.0701	-.0249
	(581)	(581)	(581)	(581)	(581)	(580)
	P= .034	P= .027	P= .244	P= .383	P= .046	P= .275
SPFC	.0495	-.0512	.0069	.0567	.0279	-.0387
	(581)	(581)	(581)	(581)	(581)	(580)
	P= .117	P= .109	P= .434	P= .086	P= .251	P= .176
SPFE	-.0249	.0138	.0480	.0064	-.0011	-.0283
	(581)	(581)	(581)	(581)	(581)	(580)
	P= .274	P= .370	P= .124	P= .439	P= .490	P= .248
SPFF	.0236	.0188	-.0001	.0460	.0376	-.0212
	(581)	(581)	(581)	(581)	(581)	(580)
	P= .285	P= .326	P= .499	P= .134	P= .183	P= .305
SPFG	-.0893	.0198	-.0373	.0037	-.0319	-.0083
	(581)	(581)	(581)	(581)	(581)	(580)
	P= .016	P= .317	P= .185	P= .465	P= .222	P= .421
SPFH	.0026	-.0025	-.0592	.0760	.0764	-.0324
	(581)	(581)	(581)	(581)	(581)	(580)
	P= .475	P= .476	P= .077	P= .034	P= .033	P= .218
SPFI	.0373	.0189	.0132	-.1069	-.0903	-.0109
	(581)	(581)	(581)	(581)	(581)	(580)
	P= .185	P= .324	P= .376	P= .005	P= .015	P= .397
SPFL	-.0745	.0123	-.0079	-.0487	-.0801	-.0217
	(581)	(581)	(581)	(581)	(581)	(580)
	P= .036	P= .383	P= .424	P= .121	P= .027	P= .301
SPFM	.0988	.1006	.0370	-.0223	.0188	-.0740
	(581)	(581)	(581)	(581)	(581)	(580)
	P= .009	P= .008	P= .187	P= .296	P= .325	P= .038
SPFN	-.1178	-.0139	.0071	-.0244	-.0487	-.0348
	(581)	(581)	(581)	(581)	(581)	(580)
	P= .002	P= .369	P= .432	P= .279	P= .121	P= .201
SPFO	-.0240	.0101	.0034	-.0716	-.0700	.0334
	(581)	(581)	(581)	(581)	(581)	(580)
	P= .282	P= .404	P= .468	P= .042	P= .046	P= .211
SPFQ1	.0478	.0311	.0089	.0401	.0539	.0468
	(581)	(581)	(581)	(581)	(581)	(580)
	P= .125	P= .227	P= .415	P= .167	P= .097	P= .130
SPFQ2	-.0268	.0013	.0813	-.0470	-.0345	.0540
	(581)	(581)	(581)	(581)	(581)	(580)
	P= .259	P= .488	P= .025	P= .129	P= .203	P= .097
SPFQ3	-.0888	.0352	.0451	-.0264	-.0077	-.0241
	(581)	(581)	(581)	(581)	(581)	(580)
	P= .016	P= .199	P= .139	P= .263	P= .427	P= .282
SPFQ4	-.0384	.0622	.0265	-.0591	-.0557	-.0200
	(581)	(581)	(581)	(581)	(581)	(580)
	P= .178	P= .067	P= .262	P= .077	P= .090	P= .315

0(COEFFICIENT / (CASES) / 1-TAILED SIG)   " . " IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED

Appendix D: Results of factor analysis

For each of the five groups of analysis (all cases, young/old drivers, small/ large depots) the results are presented in four parts:

i) Test variables: structure matrix and factor correlation matrix;

ii) Correlations between test factors and performance variables;

iii) Performance variables: structure matrix and factor correlation matrix;

iv) Miscellaneous statistics for each variable, including communalities and proportion of variance: for both test and performance factors;

Correlation matrix between test and performance factors.

Each page will just be headed with the group the statistics refer to and the part number, based on the above.

Appendix D1: All cases (i)

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5
SPFE	.60494	-.06627	.31147	-.16956	-.17984
SPFQ1	.46833	-.01065	.00331	-.11747	-.25425
SPFN	-.38819	-.06507	-.09821	.34076	.21592
SPFI	-.36260	.01501	.02626	-.18240	.02947
SPFQ4	.22648	-.79158	-.13133	-.04977	-.22857
SPFC	-.05167	.76065	.18983	.14374	.11782
SPFO	-.14367	-.74143	-.18911	-.03143	-.07784
SPFL	.41430	-.42678	.08164	-.08739	-.00836
SPFH	.35528	.38142	.69498	-.16915	.14236
SPFF	.40241	.14870	.68185	.07154	-.13453
SPFQ2	-.01717	-.08827	-.64530	-.09164	-.04294
SPFA	-.09933	.06467	.52206	.00502	.15907
SPFM	.04345	.17461	-.15644	-.35369	-.30038
WRTWRONG	.03789	-.10339	-.01885	-.26431	-.03587
SPFG	-.14280	.11689	.12166	.15269	.62490
SPFQ3	-.16330	.40226	.05449	.10320	.59204
AGE	-.23278	-.09200	-.14927	-.27883	.47564
CFTOTAL	.15364	.12174	-.04380	.15473	-.18788
WRTRIGHT	.06250	.11187	.02050	-.09355	-.14074
SPFB	.12002	.07541	-.12388	-.05455	-.01835

	FACTOR 6
SPFE	.14459
SPFQ1	.07919
SPFN	-.17425
SPFI	-.19482
SPFQ4	.00023
SPFC	.11544
SPFO	-.19730
SPFL	-.12869
SPFH	.10423
SPFF	.12851
SPFQ2	.05840
SPFA	-.15753
SPFM	.17226
WRTWRONG	.00066
SPFG	-.05643
SPFQ3	-.02849
AGE	-.42326
CFTOTAL	.79624
WRTRIGHT	.69917
SPFB	.44071

FACTOR CORRELATION MATRIX:

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5
FACTOR 1	1.00000				
FACTOR 2	-.05939	1.00000			
FACTOR 3	.14406	.13296	1.00000		
FACTOR 4	-.07981	.03491	.03649	1.00000	
FACTOR 5	-.19834	.08493	.06873	.12134	1.00000
FACTOR 6	.20585	.17828	-.05367	.02196	-.19053

	FACTOR 6
FACTOR 6	1.00000

Appendix D2: All cases (ii)

	TEST1	TEST2	TEST3	TEST4	TEST5	TEST6
AD1	.1138	.0300	.0383	.0084	-.1173	.1165
	(563)	(563)	(563)	(563)	(563)	(563)
	P= .003	P= .239	P= .182	P= .421	P= .003	P= .003
AD2	.0480	.0702	.0358	-.0601	-.0765	.1019
	(563)	(563)	(563)	(563)	(563)	(563)
	P= .128	P= .048	P= .198	P= .077	P= .035	P= .008
AD3	.0161	.0205	.0163	-.0097	-.1066	.0498
	(563)	(563)	(563)	(563)	(563)	(563)
	P= .351	P= .314	P= .350	P= .409	P= .006	P= .119
AD4	.1137	-.0502	-.0058	-.0147	-.0378	.0146
	(563)	(563)	(563)	(563)	(563)	(563)
	P= .003	P= .117	P= .446	P= .364	P= .185	P= .364
AD5	.0927	-.0471	.1023	-.0868	-.1074	.0507
	(563)	(563)	(563)	(563)	(563)	(563)
	P= .014	P= .132	P= .008	P= .020	P= .005	P= .115
AD6	.0068	-.0461	-.0385	-.0896	-.0367	.0206
	(563)	(563)	(563)	(563)	(563)	(563)
	P= .436	P= .137	P= .181	P= .017	P= .192	P= .313
AD7	.1403	.0103	.0630	.0140	-.0922	.0527
	(563)	(563)	(563)	(563)	(563)	(563)
	P= .000	P= .403	P= .068	P= .371	P= .014	P= .106
AD8	.1210	-.0180	.1341	.0515	-.0785	.0460
	(563)	(563)	(563)	(563)	(563)	(563)
	P= .002	P= .335	P= .001	P= .111	P= .031	P= .138
AD9	.0635	.0475	.0880	-.0295	-.0516	.0473
	(563)	(563)	(563)	(563)	(563)	(563)
	P= .066	P= .130	P= .018	P= .242	P= .111	P= .131
ACOMP	.0876	.0145	.0134	-.0497	-.1080	.0607
	(563)	(563)	(563)	(563)	(563)	(563)
	P= .019	P= .366	P= .375	P= .120	P= .005	P= .075
AVTOTDIS	.1602	.0171	.1154	-.0264	-.1613	.1245
	(563)	(563)	(563)	(563)	(563)	(563)
	P= .000	P= .343	P= .003	P= .266	P= .000	P= .002
AVLATE	.1177	.0451	.1143	.0035	-.1367	.1352
	(376)	(376)	(376)	(376)	(376)	(376)
	P= .011	P= .191	P= .013	P= .473	P= .004	P= .004
AVABS	.1521	.0143	.1047	.0535	-.1833	.0625
	(361)	(361)	(361)	(361)	(361)	(361)
	P= .002	P= .393	P= .023	P= .155	P= .000	P= .118
SHORTS	.0872	-.0660	.0736	.0557	-.1313	-.1558
	(431)	(431)	(431)	(431)	(431)	(431)
	P= .035	P= .086	P= .063	P= .124	P= .003	P= .001
ACOMM	-.0777	-.0135	-.0207	-.1093	.0876	-.0011
	(563)	(563)	(563)	(563)	(563)	(563)
	P= .033	P= .375	P= .312	P= .005	P= .019	P= .490
AA01	.0582	.0863	.0511	-.0397	-.1107	.1011
	(571)	(571)	(571)	(571)	(571)	(571)
	P= .083	P= .020	P= .112	P= .172	P= .004	P= .008
AA02	.0407	-.0044	.0163	-.0640	-.0797	-.0280
	(571)	(571)	(571)	(571)	(571)	(571)
	P= .166	P= .458	P= .349	P= .063	P= .029	P= .252
AA03	.0756	.0117	.0065	-.0351	-.0664	.0502
	(571)	(571)	(571)	(571)	(571)	(571)
	P= .036	P= .390	P= .439	P= .201	P= .056	P= .116
AA04	.1166	.0208	.0376	-.0515	-.1034	.1527
	(571)	(571)	(571)	(571)	(571)	(571)
	P= .003	P= .310	P= .185	P= .109	P= .007	P= .000
AA05	-.0072	.0054	.0532	-.0016	-.0335	.0333
	(571)	(571)	(571)	(571)	(571)	(571)
	P= .432	P= .449	P= .102	P= .485	P= .212	P= .214
AA06	.0287	.0834	.0217	.0146	-.0341	.1185
	(571)	(571)	(571)	(571)	(571)	(571)
	P= .247	P= .023	P= .303	P= .364	P= .208	P= .002
AA07	.0577	-.0338	-.0026	-.0352	-.1171	-.0427
	(571)	(571)	(571)	(571)	(571)	(571)
	P= .084	P= .210	P= .475	P= .200	P= .003	P= .154
AA08	-.0148	.0099	-.0516	-.0068	-.0577	.0051
	(571)	(571)	(571)	(571)	(571)	(571)
	P= .362	P= .406	P= .109	P= .435	P= .084	P= .452
AA09	-.0829	.0452	-.0367	-.0208	.0172	.0125
	(571)	(571)	(571)	(571)	(571)	(571)
	P= .024	P= .140	P= .190	P= .310	P= .341	P= .383
ACOL	.1100	.0826	.0607	-.0668	-.1535	.1473
	(571)	(571)	(571)	(571)	(571)	(571)
	P= .004	P= .024	P= .074	P= .056	P= .000	P= .000
ANCOL	.0907	.0285	.0758	.0153	-.0683	.0389
	(577)	(577)	(577)	(577)	(577)	(577)
	P= .015	P= .247	P= .034	P= .357	P= .051	P= .176
AAD3	.1529	-.0219	.0791	.0043	-.1301	.0652
	(563)	(563)	(563)	(563)	(563)	(563)
	P= .000	P= .302	P= .030	P= .460	P= .001	P= .061
AAD6	.0662	.0081	.0665	-.1011	-.1073	.0683
	(563)	(563)	(563)	(563)	(563)	(563)
	P= .058	P= .424	P= .057	P= .008	P= .005	P= .053
AAA3	.0339	-.0254	-.0142	-.0467	-.0183	.1360
	(571)	(571)	(571)	(571)	(571)	(571)
	P= .210	P= .272	P= .368	P= .132	P= .331	P= .001
AAA6	.0479	.0810	.0314	-.0213	-.0463	.0876
	(571)	(571)	(571)	(571)	(571)	(571)
	P= .127	P= .027	P= .227	P= .305	P= .135	P= .018

Appendix D3: All cases (iii)

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5
AD1	.70960	.10461	-.21221	-.01732	-.26349
AD2	.59832	-.19653	-.34157	-.05472	-.04855
AA01	.54849	.08493	-.02660	-.03164	.14511
AD3	.41767	-.06982	-.03952	-.03136	-.12576
AA07	-.01991	.64502	.19405	.00048	-.03798
AA08	-.02939	.49970	.04811	.02459	-.12625
AD4	.15544	.03014	-.41640	-.04002	-.18101
AD6	.24298	.15457	-.25500	-.00102	-.07106
ACOMM	.00056	-.09939	-.21168	-.01902	.02875
AA04	.05656	-.02735	-.02740	1.04568	-.02569
AA03	-.04432	.02945	.05337	.35059	-.00448
AD8	.03968	.16863	.11370	.03790	-.69670
AD7	.11650	.09536	-.23001	-.00521	-.53725
AD5	.37922	-.02549	-.24022	.00574	-.39560
AA06	.42192	-.07509	-.12765	.08685	.09600
AA05	-.07981	-.01692	.08866	.07877	-.03490
AA02	.09508	.09902	.03886	-.04693	-.00635

	FACTOR 6	FACTOR 7
AD1	.07470	-.09353
AD2	-.01824	.20426
AA01	.17337	.31456
AD3	-.01319	.16810
AA07	-.05902	.15145
AA08	-.01886	.00629
AD4	-.00125	-.07488
AD6	-.03676	-.11885
ACOMM	-.03252	-.01386
AA04	.37940	.05550
AA03	-.03440	-.07260
AD8	-.00116	-.03635
AD7	.01282	-.06148
AD5	-.08245	.16653
AA06	.61669	.01516
AA05	.50214	-.01806
AA02	-.01553	.38176

FACTOR CORRELATION MATRIX:

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5
FACTOR 1	1.00000				
FACTOR 2	.02353	1.00000			
FACTOR 3	-.25009	.10436	1.00000		
FACTOR 4	-.02787	.01991	.05365	1.00000	
FACTOR 5	-.13506	-.13404	.11046	-.01850	1.00000
FACTOR 6	.07239	-.02658	.05459	.11319	.04661
FACTOR 7	.16513	-.00635	.11558	-.07413	.04870

	FACTOR 6	FACTOR 7
FACTOR 6	1.00000	
FACTOR 7	-.00233	1.00000

Appendix D4: All cases (iv)

VARIABLE	COMMUNALITY	*	FACTOR	SS LOADINGS	PCT OF VAR	CUM PCT
		*				
WRTRIGHT	.51666	*	1	2.13681	10.7	10.7
WRTWRONG	.07945	*	2	2.74546	13.7	24.4
CFTOTAL	.65627	*	3	1.66481	8.3	32.7
SPFA	.31929	*	4	.73965	3.7	36.4
SPFB	.21773	*	5	.68778	3.4	39.9
SPFC	.60100	*	6	.60927	3.0	42.9
SPFE	.44560	*				
SPFF	.59291	*				
SPFG	.40940	*				
SPFH	.70685	*				
SPFI	.19829	*				
SPFL	.36699	*				
SPFM	.26700	*				
SPFN	.27941	*				
SPFO	.59308	*				
SPFQ1	.25681	*				
SPFQ2	.42690	*				
SPFQ3	.47783	*				
SPFQ4	.68416	*				
AGE	.48815	*				

OBLIMIN ROTATION 1 FOR EXTRACTION 1 IN ANALYSIS 1 - KAISER NORMALIZATION.

0 OBLIMIN CONVERGED IN 21 ITERATIONS.

VARIABLE	COMMUNALITY	*	FACTOR	SS LOADINGS	PCT OF VAR	CUM PCT
		*				
AD1	.57863	*	1	1.84358	10.8	10.8
AD2	.45446	*	2	1.01170	6.0	16.8
AD3	.20548	*	3	.79709	4.7	21.5
AD4	.19828	*	4	1.26199	7.4	28.9
AD5	.31451	*	5	.50903	3.0	31.9
AD6	.14629	*	6	.52034	3.1	35.0
AD7	.32279	*	7	.30125	1.8	36.7
AD8	.52624	*				
ACOMM	.05542	*				
AA01	.42331	*				
AA02	.15756	*				
AA03	.13294	*				
AA04	1.19395	*				
AA05	.27332	*				
AA06	.54910	*				
AA07	.45615	*				
AA08	.25655	*				

OBLIMIN ROTATION 1 FOR EXTRACTION 1 IN ANALYSIS 1 - KAISER NORMALIZATION.

0 OBLIMIN CONVERGED IN 15 ITERATIONS.

0- - - - - - - - - - - - - - P E A R S O N C O R R E L A T I O N C O E F F I C I E N T S - - - - - -
0

	PERF1	PERF2	PERF3	PERF4	PERF5	PERF6	PERF7
TEST1	.1061	.0685	-.0680	.1024	-.1565	.0336	.0338
	(562)	(562)	(562)	(562)	(562)	(562)	(562)
	P= .006	P= .052	P= .054	P= .008	P= .000	P= .213	P= .212
TEST2	.0609	-.0304	.0123	.0116	.0395	.0636	.0400
	(562)	(562)	(562)	(562)	(562)	(562)	(562)
	P= .075	P= .236	P= .386	P= .392	P= .175	P= .066	P= .172
TEST3	.0535	-.0105	.0219	.0123	-.1237	.0422	.0627
	(562)	(562)	(562)	(562)	(562)	(562)	(562)
	P= .103	P= .402	P= .302	P= .386	P= .002	P= .159	P= .069
TEST4	-.0419	-.0190	.0817	-.0332	-.0202	.0236	-.0838
	(562)	(562)	(562)	(562)	(562)	(562)	(562)
	P= .161	P= .327	P= .026	P= .216	P= .317	P= .289	P= .024
TEST5	-.1445	-.1155	.0161	-.0775	.1174	-.0388	-.1035
	(562)	(562)	(562)	(562)	(562)	(562)	(562)
	P= .000	P= .003	P= .352	P= .033	P= .003	P= .179	P= .007
TEST6	.1381	-.0279	-.0671	.1349	-.0551	.1198	.0105
	(562)	(562)	(562)	(562)	(562)	(562)	(562)
	P= .001	P= .255	P= .056	P= .001	P= .096	P= .002	P= .402

0(COEFFICIENT / (CASES) / 1-TAILED SIG) " . " IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED
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Appendix D5: Drivers 40 years and under (i)

STRUCTURE MATRIX

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5	FACTOR 6
SPFE	.71531	-.08799	.07971	.01297	.23345	-.12017
SPFQ1	.48315	.00915	.06503	.02519	.02084	-.17573
SPFL	.46604	-.41679	-.02779	.14281	.03612	.12058
SPFN	-.44784	.02184	-.15326	.14895	-.12121	.35432
SPFQ4	.17561	-.82255	-.00295	.02824	-.12785	-.07827
SPFC	-.07639	.78183	-.04421	.02545	.15156	-.02503
SPFO	-.10363	-.68428	-.13044	-.05419	-.11598	.07438
SPFQ3	-.23590	.48720	.02761	.17923	.11021	.31440
WRTRIGHT	.05853	.03944	.79936	-.20533	.03992	-.17666
CFTOTAL	.02602	.10009	.67379	-.04338	-.06196	-.20641
SPFB	.08608	-.02836	.44254	-.01861	-.10446	.04724
SPFM	.12868	.06284	.19342	-.54693	-.20402	-.22151
SPFI	-.26270	.04871	-.09572	-.49054	.03816	.12321
WRTWRONG	.08465	-.09618	.12955	-.20548	.00177	-.08208
SPFH	.42521	.34445	.05114	.06889	.70365	-.08962
SPFF	.38978	.13710	.05116	.11773	.64042	-.33264
SPFQ2	-.07275	-.11624	.13210	-.15302	-.62446	.10011
SPFA	.01273	.02570	-.03877	-.06398	.61496	.03332
AGE	-.11459	-.03639	-.15971	.01212	-.15695	.55377
SPFG	-.27076	.30637	.01956	.28004	.22231	.48126

FACTOR CORRELATION MATRIX:

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5	FACTOR 6
FACTOR 1	1.00000					
FACTOR 2	-.12356	1.00000				
FACTOR 3	.12696	.04545	1.00000			
FACTOR 4	.01005	.06111	-.10965	1.00000		
FACTOR 5	.12022	.15905	-.05204	.08442	1.00000	
FACTOR 6	-.24962	.01633	-.13656	.14974	-.04070	1.00000

<u>Appendix D6</u>: Drivers 40 years and under (ii)

	TEST1	TEST2	TEST3	TEST4	TEST5	TEST6
AD1	.1004	.0388	.0691	.0213	.0085	-.0737
	(309)	(309)	(309)	(309)	(309)	(309)
	P= .039	P= .248	P= .113	P= .354	P= .441	P= .098
AD2	.0497	.0563	.0686	-.0383	.0528	-.1235
	(309)	(309)	(309)	(309)	(309)	(309)
	P= .192	P= .162	P= .115	P= .251	P= .178	P= .015
AD3	.0138	.0037	-.0158	-.0385	.0082	-.0750
	(309)	(309)	(309)	(309)	(309)	(309)
	P= .405	P= .474	P= .391	P= .250	P= .443	P= .094
AD4	.0919	-.1095	-.0294	.0096	-.0769	-.0128
	(309)	(309)	(309)	(309)	(309)	(309)
	P= .053	P= .027	P= .304	P= .433	P= .089	P= .412
AD5	.1313	-.0971	-.0086	-.0896	.1068	-.1798
	(309)	(309)	(309)	(309)	(309)	(309)
	P= .010	P= .044	P= .440	P= .058	P= .030	P= .001
AD6	.1133	-.0229	.0849	-.2091	.0303	-.0116
	(309)	(309)	(309)	(309)	(309)	(309)
	P= .023	P= .344	P= .068	P= .000	P= .298	P= .420
AD7	.1382	-.0031	.0248	.1231	.0524	-.0581
	(309)	(309)	(309)	(309)	(309)	(309)
	P= .008	P= .478	P= .332	P= .015	P= .179	P= .154
AD8	.1143	-.0293	-.0716	.1280	.1452	-.0446
	(309)	(309)	(309)	(309)	(309)	(309)
	P= .022	P= .304	P= .105	P= .012	P= .005	P= .217
AD9	.1272	-.0183	-.0134	-.0499	.0688	-.1256
	(309)	(309)	(309)	(309)	(309)	(309)
	P= .013	P= .374	P= .407	P= .191	P= .114	P= .014
ACOMP	.1001	-.0273	.0364	-.0831	-.0045	-.1321
	(309)	(309)	(309)	(309)	(309)	(309)
	P= .039	P= .316	P= .262	P= .073	P= .468	P= .010
AVTOTDIS	.1725	-.0141	.0145	.0272	.1152	-.1580
	(309)	(309)	(309)	(309)	(309)	(309)
	P= .001	P= .402	P= .400	P= .317	P= .021	P= .003
AVLATE	.1162	.0126	.0746	-.0175	.1536	-.0772
	(221)	(221)	(221)	(221)	(221)	(221)
	P= .042	P= .426	P= .135	P= .398	P= .011	P= .127
AVABS	.1149	-.0310	-.0210	.0126	.0298	-.0996
	(212)	(212)	(212)	(212)	(212)	(212)
	P= .048	P= .327	P= .380	P= .427	P= .333	P= .074
SHORTS	.0149	-.1625	-.2994	.0640	.0001	.1160
	(240)	(240)	(240)	(240)	(240)	(240)
	P= .409	P= .006	P= .000	P= .162	P= .499	P= .036
ACOMM	.0531	.0162	.0657	-.0324	-.0127	.0268
	(309)	(309)	(309)	(309)	(309)	(309)
	P= .176	P= .388	P= .125	P= .285	P= .412	P= .319
AA01	.0334	.1219	.0744	-.0416	.0839	-.1215
	(316)	(316)	(316)	(316)	(316)	(316)
	P= .277	P= .015	P= .094	P= .231	P= .068	P= .015
AA02	.0526	-.0525	-.0045	-.0551	-.0477	-.0553
	(316)	(316)	(316)	(316)	(316)	(316)
	P= .176	P= .176	P= .468	P= .164	P= .199	P= .163
AA03	.1371	.0379	.0607	-.0539	.0206	-.0639
	(316)	(316)	(316)	(316)	(316)	(316)
	P= .007	P= .251	P= .141	P= .170	P= .358	P= .129
AA04	.1454	-.0341	.1434	-.1022	.0547	-.1623
	(316)	(316)	(316)	(316)	(316)	(316)
	P= .005	P= .273	P= .005	P= .035	P= .166	P= .002
AA05	.0290	.0135	.0051	-.0410	.0897	-.0472
	(316)	(316)	(316)	(316)	(316)	(316)
	P= .304	P= .406	P= .464	P= .234	P= .056	P= .201
AA06	.0013	.0968	.0561	.0004	.0414	-.0837
	(316)	(316)	(316)	(316)	(316)	(316)
	P= .491	P= .043	P= .160	P= .497	P= .232	P= .069
AA07	.0601	-.1260	-.1209	-.0374	-.0300	.0284
	(316)	(316)	(316)	(316)	(316)	(316)
	P= .144	P= .013	P= .016	P= .254	P= .298	P= .307
AA08	-.0282	-.0786	-.0904	.0293	-.1218	.0154
	(316)	(316)	(316)	(316)	(316)	(316)
	P= .309	P= .082	P= .054	P= .302	P= .015	P= .392
AA09	-.0622	.0494	.0332	-.1065	-.0213	.0332
	(316)	(316)	(316)	(316)	(316)	(316)
	P= .135	P= .191	P= .279	P= .029	P= .353	P= .278
ACOL	.1050	.0932	.1240	-.0872	.0900	-.1807
	(316)	(316)	(316)	(316)	(316)	(316)
	P= .031	P= .049	P= .014	P= .061	P= .055	P= .001
ANCOL	.0987	.0024	-.0643	.0395	.0667	.0049
	(321)	(321)	(321)	(321)	(321)	(321)
	P= .039	P= .483	P= .125	P= .240	P= .117	P= .465
AAD3	.1642	-.0669	-.0662	.0929	.0662	-.1045
	(309)	(309)	(309)	(309)	(309)	(309)
	P= .002	P= .120	P= .123	P= .052	P= .123	P= .033
AAD6	.1236	-.0321	.0384	-.1022	.1051	-.1106
	(309)	(309)	(309)	(309)	(309)	(309)
	P= .015	P= .287	P= .250	P= .036	P= .033	P= .026
AAA3	.0438	-.0047	.1818	-.0428	.0104	-.0899
	(316)	(316)	(316)	(316)	(316)	(316)
	P= .219	P= .467	P= .001	P= .224	P= .427	P= .055
AAA6	.0554	.0983	.0760	.0549	.0512	-.0917
	(316)	(316)	(316)	(316)	(316)	(316)
	P= .163	P= .041	P= .089	P= .165	P= .182	P= .052

Appendix D7: Drivers 40 years and under (iii)

STRUCTURE MATRIX:

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5
AA01	.74721	-.09033	-.08870	-.02401	.12084
AD2	.54617	-.30469	.07004	-.10002	-.20492
AD1	.47839	-.45532	.30337	.09216	-.04221
AD3	.37962	.01011	.11860	-.04029	-.07266
AA02	.19172	.08987	-.01071	-.10495	.13201
AD6	.17878	-.44122	.08862	.11775	-.01258
AD4	-.01116	-.38858	.25853	-.06825	-.06755
ACOMM	-.01738	-.20448	-.03817	-.07078	-.08531
AD8	-.03624	.04055	.63811	.01521	.16386
AD7	.00679	-.15135	.59929	-.04950	.03624
AD5	.31438	-.11799	.50395	-.00485	.00397
AA04	-.00483	.06255	.01616	.64766	-.00895
AA03	-.07684	.02091	-.03919	.33914	.02468
AA07	.02880	.18705	.05705	.06327	.66116
AA08	-.03782	.00088	.09682	.00207	.53283
AA06	.40566	-.30494	-.03756	.12326	-.18039
AA05	-.11391	.11935	-.00939	.06758	.00014

	FACTOR 6
AA01	.07893
AD2	.01090
AD1	.09520
AD3	-.02474
AA02	-.07975
AD6	-.01742
AD4	.02513
ACOMM	-.01166
AD8	.00381
AD7	.00647
AD5	-.08295
AA04	.45506
AA03	-.01710
AA07	-.07288
AA08	-.02351
AA06	.63283
AA05	.56653

FACTOR CORRELATION MATRIX:

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5
FACTOR 1	1.00000				
FACTOR 2	-.12457	1.00000			
FACTOR 3	.09316	-.13424	1.00000		
FACTOR 4	-.04403	.01037	.00095	1.00000	
FACTOR 5	-.00088	.18939	.06993	.03041	1.00000
FACTOR 6	.00647	-.04047	-.00897	.16525	-.08678

	FACTOR 6
FACTOR 6	1.00000

Appendix D8: Drivers 40 years and under (iv)

VARIABLE	COMMUNALITY	*	FACTOR	SS LOADINGS	PCT OF VAR	CUM PCT
		*				
WRTRIGHT	.64798	*	1	2.16729	10.8	10.8
WRTWRONG	.06708	*	2	2.65525	13.3	24.1
CFTOTAL	.48281	*	3	1.68036	8.4	32.5
SPFA	.40535	*	4	.77983	3.9	36.4
SPFB	.21928	*	5	.90343	4.5	40.9
SPFC	.62155	*	6	.54786	2.7	43.7
SPFE	.53849	*				
SPFF	.58175	*				
SPFG	.42992	*				
SPFH	.69752	*				
SPFI	.35065	*				
SPFL	.42302	*				
SPFM	.38943	*				
SPFN	.28684	*				
SPFO	.51156	*				
SPFQ1	.24489	*				
SPFQ2	.41934	*				
SPFQ3	.36291	*				
SPFQ4	.69279	*				
AGE	.34087	*				

OBLIMIN ROTATION 1 FOR EXTRACTION 1 IN ANALYSIS 1 - KAISER NORMALIZATION.

0 OBLIMIN CONVERGED IN 13 ITERATIONS.

VARIABLE	COMMUNALITY	*	FACTOR	SS LOADINGS	PCT OF VAR	CUM PCT
		*				
AD1	.44993	*	1	1.82737	10.7	10.7
AD2	.38636	*	2	.89724	5.3	16.0
AD3	.16594	*	3	1.06928	6.3	22.3
AD4	.20552	*	4	1.01976	6.0	28.3
AD5	.33467	*	5	.52286	3.1	31.4
AD6	.23376	*	6	.39893	2.3	33.7
AD7	.37078	*				
AD8	.44015	*				
ACOMM	.05423	*				
AA01	.61031	*				
AA02	.07594	*				
AA03	.12553	*				
AA04	.55067	*				
AA05	.35364	*				
AA06	.63265	*				
AA07	.44530	*				
AA08	.30007	*				

OBLIMIN ROTATION 1 FOR EXTRACTION 1 IN ANALYSIS 1 - KAISER NORMALIZATION.

0 OBLIMIN CONVERGED IN 25 ITERATIONS.

0- - - - - - - - - - - - - - P E A R S O N C O R R E L A T I O N C O E F F I C I E

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	PERF1	PERF2	PERF3	PERF4	PERF5	PERF6
TEST1	.0629	-.0796	.1763	.1559	.0474	.0282
	(308)	(308)	(308)	(308)	(308)	(308)
	P= .135	P= .082	P= .001	P= .003	P= .204	P= .311
TEST2	.0854	.0004	-.0792	-.0266	-.0984	.0484
	(308)	(308)	(308)	(308)	(308)	(308)
	P= .067	P= .497	P= .083	P= .321	P= .042	P= .199
TEST3	.0633	-.0787	-.0381	.1449	-.1169	.0634
	(308)	(308)	(308)	(308)	(308)	(308)
	P= .134	P= .084	P= .253	P= .005	P= .020	P= .133
TEST4	-.0578	.0529	.0852	-.0987	.0053	-.0059
	(308)	(308)	(308)	(308)	(308)	(308)
	P= .156	P= .177	P= .068	P= .042	P= .463	P= .459
TEST5	.0885	.0525	.1018	.0238	-.0302	.0676
	(308)	(308)	(308)	(308)	(308)	(308)
	P= .061	P= .179	P= .037	P= .339	P= .299	P= .118
TEST6	-.1603	.0173	-.1067	-.1280	.0245	-.0854
	(308)	(308)	(308)	(308)	(308)	(308)
	P= .002	P= .381	P= .031	P= .012	P= .334	P= .067

0(COEFFICIENT / (CASES) / 1-TAILED SIG) " . " IS PRINTED IF A COEFFICIENT CANNO

Appendix D9: Drivers over 40 years (i)

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5
SPFQ4	-.79781	-.06623	-.15792	-.20939	-.02154
SPFO	-.77487	-.14933	-.29727	-.14966	.08232
SPFC	.73901	.17572	.21362	.30236	-.08610
SPFL	-.46560	-.30440	.11020	.01783	-.06057
CFTOTAL	-.01743	.69134	-.05826	.12342	-.43108
SPFB	.13576	.54184	-.08098	-.04667	-.11361
WRTRIGHT	.10049	.52415	-.02161	.09509	-.07106
SPFF	.07010	-.05250	.70766	.10434	-.16368
SPFH	.37400	.11849	.67372	.25122	-.02310
SPFQ2	-.09752	.03492	-.62323	-.12989	.02224
SPFA	.18123	-.23390	.46057	.21697	.08453
SPFQ3	.45048	.08536	.04238	.75836	.07569
SPFG	.06439	.12738	.15602	.50539	-.03268
SPFM	.18471	.09925	-.08906	-.29330	.07180
AGE	.00907	-.19871	-.04899	.02038	.70416
WRTWRONG	-.15450	-.01442	-.00686	-.04927	.22529
SPFI	-.01757	-.13725	.00722	.04550	.08152
SPFN	-.04935	-.13820	-.03545	.08336	-.01895
SPFE	-.18683	.01037	.34817	.01883	-.18879
SPFQ1	-.13862	-.21312	-.09552	-.22235	.00869

	FACTOR 6	FACTOR 7
SPFQ4	.12251	-.15210
SPFO	-.20613	.13923
SPFC	.01919	.09499
SPFL	.15468	-.34145
CFTOTAL	.31608	-.02861
SPFB	.31363	-.14050
WRTRIGHT	.02392	-.06523
SPFF	.25609	-.19179
SPFH	.18718	-.37861
SPFQ2	.18343	-.03917
SPFA	-.17209	.18114
SPFQ3	-.08742	.08135
SPFG	-.01906	.04290
SPFM	.27609	-.19836
AGE	-.05992	.06553
WRTWRONG	-.04025	-.18999
SPFI	-.50530	.10337
SPFN	-.15323	.60976
SPFE	.27006	-.49886
SPFQ1	.28389	-.36005

FACTOR CORRELATION MATRIX:

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5
FACTOR 1	1.00000				
FACTOR 2	.15971	1.00000			
FACTOR 3	.12002	-.07998	1.00000		
FACTOR 4	.14144	.07242	.22774	1.00000	
FACTOR 5	.01714	-.15370	-.08247	-.04861	1.00000
FACTOR 6	.02381	.12727	-.00935	-.13180	-.16774
FACTOR 7	.10663	-.04646	-.10076	.12179	-.03108

	FACTOR 6	FACTOR 7
FACTOR 6	1.00000	
FACTOR 7	-.30127	1.00000

Appendix D10: Drivers over 40 years (ii)

	TEST1	TEST2	TEST3	TEST4	TEST5	TEST6	TEST7
AD1	-.0498	.0299	.0625	-.0644	-.0774	.0474	-.0368
	(254)	(254)	(254)	(254)	(254)	(254)	(254)
	P= .215	P= .318	P= .161	P= .153	P= .109	P= .226	P= .280
AD2	.0544	.0891	.0081	-.0415	-.0287	.0759	-.0484
	(254)	(254)	(254)	(254)	(254)	(254)	(254)
	P= .194	P= .078	P= .449	P= .255	P= .325	P= .114	P= .221
AD3	.0155	.0575	-.0051	-.0517	.0336	-.0036	-.0130
	(254)	(254)	(254)	(254)	(254)	(254)	(254)
	P= .403	P= .181	P= .468	P= .206	P= .297	P= .477	P= .418
AD4	-.0010	.0198	.0726	.0417	-.0735	.0925	-.1031
	(254)	(254)	(254)	(254)	(254)	(254)	(254)
	P= .494	P= .377	P= .124	P= .254	P= .122	P= .071	P= .051
AD5	-.0128	.0174	.0470	.0280	.0418	.0357	-.0792
	(254)	(254)	(254)	(254)	(254)	(254)	(254)
	P= .420	P= .391	P= .228	P= .328	P= .254	P= .286	P= .104
AD6	-.1023	-.0017	-.1441	.0156	-.0609	-.0485	.0306
	(254)	(254)	(254)	(254)	(254)	(254)	(254)
	P= .052	P= .489	P= .011	P= .402	P= .167	P= .221	P= .314
AD7	.0197	-.0805	.0031	-.0786	-.0269	-.0115	-.0648
	(254)	(254)	(254)	(254)	(254)	(254)	(254)
	P= .377	P= .100	P= .481	P= .106	P= .335	P= .428	P= .152
AD8	-.0172	.0508	.0396	-.0353	-.0428	-.0149	-.0611
	(254)	(254)	(254)	(254)	(254)	(254)	(254)
	P= .392	P= .210	P= .265	P= .288	P= .249	P= .407	P= .166
AD9	.1078	.0955	.0865	.0467	.0183	.0610	.0214
	(254)	(254)	(254)	(254)	(254)	(254)	(254)
	P= .043	P= .065	P= .085	P= .229	P= .386	P= .167	P= .367
ACOMP	.0424	.0200	-.0006	.0078	-.0292	.0781	-.0869
	(254)	(254)	(254)	(254)	(254)	(254)	(254)
	P= .250	P= .376	P= .496	P= .451	P= .322	P= .108	P= .084
AVTOTDIS	.0033	.0741	.0447	-.0497	-.0499	.0543	-.0892
	(254)	(254)	(254)	(254)	(254)	(254)	(254)
	P= .479	P= .120	P= .239	P= .215	P= .214	P= .195	P= .078
AVLATE	.1017	.0702	.0089	-.0488	-.0552	-.0417	-.0625
	(155)	(155)	(155)	(155)	(155)	(158)	(155)
	P= .104	P= .193	P= .456	P= .273	P= .248	P= .303	P= .220
AVABS	.0707	-.1251	.1826	.0641	-.0383	-.1068	-.1130
	(149)	(149)	(149)	(149)	(149)	(149)	(149)
	P= .196	P= .064	P= .013	P= .219	P= .321	P= .097	P= .085
SHORTS	.0498	-.2086	.1375	-.0883	-.0770	.0677	-.0700
	(191)	(191)	(191)	(191)	(191)	(191)	(191)
	P= .247	P= .002	P= .029	P= .112	P= .145	P= .176	P= .168
ACOMM	-.0070	.0659	-.0209	.0438	.1085	-.0641	.0633
	(254)	(254)	(254)	(254)	(254)	(254)	(254)
	P= .456	P= .148	P= .370	P= .243	P= .042	P= .154	P= .157
AA01	-.0358	.0000	-.0599	-.0824	-.0155	.0502	-.0692
	(255)	(255)	(255)	(255)	(255)	(255)	(255)
	P= .284	P= .500	P= .171	P= .095	P= .403	P= .212	P= .136
AA02	.0415	-.1014	.1218	-.0156	.0621	-.0107	-.0323
	(255)	(255)	(255)	(255)	(255)	(255)	(255)
	P= .255	P= .053	P= .026	P= .402	P= .162	P= .432	P= .304
AA03	-.0306	-.0074	-.0373	-.0791	-.0394	-.0260	-.0278
	(255)	(255)	(255)	(255)	(255)	(255)	(255)
	P= .313	P= .453	P= .276	P= .104	P= .265	P= .340	P= .329
AA04	.0591	.0653	-.0270	.0287	-.0560	-.0061	-.0396
	(255)	(255)	(255)	(255)	(255)	(255)	(255)
	P= .174	P= .149	P= .334	P= .324	P= .186	P= .462	P= .264
AA05	-.0485	.0078	-.0802	-.0185	-.0320	-.1204	.1718
	(255)	(255)	(255)	(255)	(255)	(255)	(255)
	P= .220	P= .451	P= .101	P= .384	P= .305	P= .027	P= .003
AA06	.0388	.1461	-.0453	.0282	.0419	.0507	.0029
	(255)	(255)	(255)	(255)	(255)	(255)	(255)
	P= .269	P= .010	P= .236	P= .327	P= .252	P= .210	P= .482
AA07	.0717	-.0218	-.0279	-.0294	-.0373	-.0209	-.0685
	(255)	(255)	(255)	(255)	(255)	(255)	(255)
	P= .127	P= .364	P= .329	P= .320	P= .277	P= .370	P= .138
AA08	.1653	.1116	.0337	-.0219	-.0065	.0062	-.0720
	(255)	(255)	(255)	(255)	(255)	(255)	(255)
	P= .004	P= .038	P= .296	P= .364	P= .459	P= .461	P= .126
AA09	.0354	.0481	-.0621	-.0182	.0314	.0283	.0467
	(255)	(255)	(255)	(255)	(255)	(255)	(255)
	P= .287	P= .222	P= .162	P= .386	P= .309	P= .327	P= .229
ACOL	-.0055	.0127	-.0510	-.0721	-.0367	.0284	-.0797
	(255)	(255)	(255)	(255)	(255)	(255)	(255)
	P= .465	P= .420	P= .209	P= .126	P= .280	P= .326	P= .102
ANCOL	.0704	.0958	-.0126	-.0012	-.0468	.0609	-.0467
	(256)	(256)	(256)	(256)	(256)	(256)	(256)
	P= .131	P= .063	P= .421	P= .493	P= .228	P= .166	P= .229
AAD3	.0042	.0484	.0159	-.0371	.0417	.0219	-.0783
	(254)	(254)	(254)	(254)	(254)	(254)	(254)
	P= .473	P= .221	P= .400	P= .278	P= .254	P= .364	P= .107
AAD6	.0349	.1148	-.0034	-.0972	-.0956	.0651	-.0615
	(254)	(254)	(254)	(254)	(254)	(254)	(254)
	P= .290	P= .034	P= .479	P= .061	P= .064	P= .151	P= .164
AAA3	-.0504	.0592	-.0280	-.0177	.0141	.0471	-.0053
	(255)	(255)	(255)	(255)	(255)	(255)	(255)
	P= .212	P= .173	P= .328	P= .389	P= .412	P= .227	P= .466
AAA6	.0380	.1026	-.1141	-.1117	.0964	-.0481	.0051
	(255)	(255)	(255)	(255)	(255)	(255)	(255)
	P= .273	P= .051	P= .034	P= .037	P= .062	P= .222	P= .468

Appendix D11: Drivers over 40 years (iii)

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5
AD2	.71411	-.04916	.16586	.01423	.31006
AD3	.68896	.07781	.07838	.00070	.13978
AD1	.68342	.07107	.06980	.02352	-.01454
AD5	.57159	-.02535	.09405	.05000	.12552
AA07	-.13268	.70095	-.09171	-.05802	-.12342
AA08	-.05629	.40304	-.09800	.03071	-.20161
AD6	.21992	.39148	-.07513	-.02983	.11371
AA05	.01972	-.05335	.52675	-.00720	-.09623
AA06	.07938	-.08885	.39384	.00817	.09822
AA01	.28347	.19820	.35799	.00098	.12777
AA04	.15445	-.01930	.13728	1.12304	.11672
AA03	-.04164	-.01845	-.06411	.48057	-.08111
AD8	.10587	.01737	-.11087	.10258	-.47017
AD4	.25191	.04795	.02447	-.01482	.31451
ACOMM	.06454	-.09365	-.02378	.01468	.26322
AD7	.17283	.13506	.04551	.02816	.05792
AA02	.06939	.07121	.10340	.00276	.00618

	FACTOR 6	FACTOR 7
AD2	.11234	.07120
AD3	.07715	-.11785
AD1	.13902	-.12863
AD5	.13314	-.01139
AA07	-.12808	-.21250
AA08	.15778	-.02973
AD6	.23896	.06002
AA05	.03284	-.02651
AA06	-.03136	-.11721
AA01	-.18756	.07064
AA04	-.02801	-.07564
AA03	.04787	.03002
AD8	.37709	-.04794
AD4	.11926	-.19150
ACOMM	.08058	.02631
AD7	.72851	-.00653
AA02	-.01446	-.52118

FACTOR CORRELATION MATRIX:

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5
FACTOR 1	1.00000				
FACTOR 2	.06842	1.00000			
FACTOR 3	.15268	-.04781	1.00000		
FACTOR 4	.03128	-.03708	-.00567	1.00000	
FACTOR 5	.21369	-.07727	.06943	-.04516	1.00000
FACTOR 6	.16949	.04418	-.11919	.05645	-.03079
FACTOR 7	-.06061	-.06142	-.06458	.00088	.00620

	FACTOR 6	FACTOR 7
FACTOR 6	1.00000	
FACTOR 7	-.01464	1.00000

Appendix D12: Drivers over 40 years (iv)

FINAL STATISTICS:

VARIABLE	COMMUNALITY	*	FACTOR	SS LOADINGS	PCT OF VAR	CUM PCT
		*				
WRTRIGHT	.28330	*	1	2.93099	14.7	14.7
WRTWRONG	.10851	*	2	1.67314	8.4	23.0
CFTOTAL	.64873	*	3	1.69717	8.5	31.5
SPFA	.33846	*	4	1.03829	5.2	36.7
SPFB	.36407	*	5	.65823	3.3	40.0
SPFC	.60232	*	6	.50264	2.5	42.5
SPFE	.41474	*	7	.41812	2.1	44.6
SPFF	.57807	*				
SPFG	.26863	*				
SPFH	.69385	*				
SPFI	.26422	*				
SPFL	.41097	*				
SPFM	.22011	*				
SPFN	.39793	*				
SPFO	.70637	*				
SPFQ1	.26252	*				
SPFQ2	.42668	*				
SPFQ3	.73649	*				
SPFQ4	.66755	*				
AGE	.52503	*				

OBLIMIN ROTATION 1 FOR EXTRACTION 1 IN ANALYSIS 1 - KAISER NORMALIZATION.

0 OBLIMIN CONVERGED IN 22 ITERATIONS.

VARIABLE	COMMUNALITY	*	FACTOR	SS LOADINGS	PCT OF VAR	CUM PCT
		*				
AD1	.50239	*	1	2.07165	12.2	12.2
AD2	.55737	*	2	.97572	5.7	17.9
AD3	.48457	*	3	.57132	3.4	21.3
AD4	.17928	*	4	1.22256	7.2	28.5
AD5	.33366	*	5	.92133	5.4	33.9
AD6	.25433	*	6	.62653	3.7	37.6
AD7	.56713	*	7	.36224	2.1	39.7
AD8	.38527	*				
ACOMM	.08508	*				
AAO1	.27812	*				
AAO2	.27941	*				
AAO3	.24019	*				
AAO4	1.32444	*				
AAO5	.30851	*				
AAO6	.17423	*				
AAO7	.57928	*				
AAO8	.21810	*				

OBLIMIN ROTATION 1 FOR EXTRACTION 1 IN ANALYSIS 1 - KAISER NORMALIZATION.

0 OBLIMIN CONVERGED IN 38 ITERATIONS.

0- - - - - - - - - - - - - - P E A R S O N C O R R E L A T I O N C O E F F I C I E N T S

0

	PERF1	PERF2	PERF3	PERF4	PERF5	PERF6	PERF7
TEST1	-.0036	.0558	.0060	.0803	.0241	.0026	-.0659
	(254)	(254)	(254)	(254)	(254)	(254)	(254)
	P= .477	P= .188	P= .462	P= .101	P= .351	P= .483	P= .148
TEST2	.0732	-.0079	.0527	.0732	-.0014	-.0458	.0481
	(254)	(254)	(254)	(254)	(254)	(254)	(254)
	P= .123	P= .450	P= .201	P= .123	P= .491	P= .234	P= .223
TEST3	.0242	-.0665	-.0677	-.0230	-.0167	.0289	-.1260
	(254)	(254)	(254)	(254)	(254)	(254)	(254)
	P= .350	P= .146	P= .141	P= .357	P= .396	P= .323	P= .022
TEST4	-.0448	-.0438	-.0200	.0518	.0552	-.0524	-.0119
	(254)	(254)	(254)	(254)	(254)	(254)	(254)
	P= .238	P= .243	P= .376	P= .206	P= .190	P= .203	P= .425
TEST5	-.0333	-.0533	-.0032	-.0641	.0312	-.0249	-.0318
	(254)	(254)	(254)	(254)	(254)	(254)	(254)
	P= .299	P= .199	P= .480	P= .154	P= .310	P= .347	P= .307
TEST6	.0549	-.0261	-.0304	-.0247	.0649	-.0066	.0062
	(254)	(254)	(254)	(254)	(254)	(254)	(254)
	P= .192	P= .339	P= .315	P= .347	P= .151	P= .458	P= .461
TEST7	-.0573	-.0779	.0861	-.0203	-.0248	-.0730	.0502
	(254)	(254)	(254)	(254)	(254)	(254)	(254)
	P= .181	P= .108	P= .086	P= .374	P= .347	P= .123	P= .213

0(COEFFICIENT / (CASES) / 1-TAILED SIG)   " . " IS PRINTED IF A COEFFICIENT CANNOT BE

Appendix D13: Drivers in small depots (i)

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5
SPFQ4	-.84344	.02604	-.21415	.18591	-.19210
SPFC	.76575	.25055	.08788	-.04099	.03975
SPFO	-.63925	-.23132	-.17215	-.18819	-.02965
SPFQ3	.59054	-.06746	-.07041	-.16790	.53423
SPFL	-.45899	-.08641	.08954	.40067	.05714
CFTOTAL	.10382	.79697	.09135	.02496	-.17230
WRTRIGHT	.13175	.70485	.16726	.13617	.24154
AGE	-.05305	-.54124	-.12036	-.18432	.30234
SPFB	.24477	.44573	.05353	.03188	.03882
SPFH	.40973	.19989	.73819	.20498	.28976
SPFF	.12850	.16881	.69110	.13813	.02276
SPFQ2	.01251	-.04868	-.64494	.04217	-.04898
SPFA	.14177	-.06547	.41509	-.04257	.31293
SPFE	-.09537	.27995	.42825	.54492	-.04998
SPFQ1	-.08933	.02551	.07121	.54235	-.26702
SPFN	-.00987	-.10687	.03230	-.46286	-.05032
SPFG	.07566	-.02906	.14070	-.03319	.57912
SPFI	.12408	-.24502	.13140	-.19968	.26599
SPFM	.14802	.13937	-.08079	.03156	-.01206
WRTWRONG	-.12912	-.06494	-.00514	.05477	-.02783

	FACTOR 6	FACTOR 7
SPFQ4	-.10391	.06747
SPFC	.23020	-.17414
SPFO	-.29268	.20628
SPFQ3	.01322	-.07611
SPFL	-.31556	.09232
CFTOTAL	.32667	-.17815
WRTRIGHT	.14858	-.03002
AGE	.07638	.16276
SPFB	.34554	-.27578
SPFH	.20673	-.06434
SPFF	-.11457	.02377
SPFQ2	.13437	.02130
SPFA	-.20122	.15424
SPFE	-.05576	-.05815
SPFQ1	-.06874	.06002
SPFN	-.12522	.01552
SPFG	-.00322	.01267
SPFI	-.15359	.08004
SPFM	.58921	-.05030
WRTWRONG	-.01491	.89058

FACTOR CORRELATION MATRIX:

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5
FACTOR 1	1.00000				
FACTOR 2	.11104	1.00000			
FACTOR 3	.12092	.12363	1.00000		
FACTOR 4	-.10737	.17953	.10533	1.00000	
FACTOR 5	.17540	-.11471	.12609	-.10104	1.00000
FACTOR 6	.21381	.23378	-.14306	.02388	-.02480
FACTOR 7	-.13538	-.19067	.02283	-.00487	.06033

	FACTOR 6	FACTOR 7
FACTOR 6	1.00000	
FACTOR 7	-.12745	1.00000

Appendix D14: Drivers in small depots (ii)

	TEST1	TEST2	TEST3	TEST4	TEST5	TEST6	TEST7
AD1	-.1008 (137) P= .121	.1421 (137) P= .049	.0818 (137) P= .171	.0315 (137) P= .358	-.0037 (137) P= .483	.0159 (137) P= .427	.0194 (137) P= .411
AD2	-.0643 (137) P= .228	-.1117 (137) P= .097	.0404 (137) P= .320	.0150 (137) P= .431	.0827 (137) P= .168	.0464 (137) P= .295	.1926 (137) P= .012
AD3	.0781 (137) P= .182	-.0095 (137) P= .456	.0268 (137) P= .378	.0095 (137) P= .456	.1324 (137) P= .062	.0717 (137) P= .203	-.0223 (137) P= .398
AD4	-.0261 (137) P= .381	-.0117 (137) P= .446	.0040 (137) P= .481	.1211 (137) P= .079	-.1569 (137) P= .034	-.0143 (137) P= .434	-.1049 (137) P= .111
AD5	.0121 (137) P= .444	.0344 (137) P= .345	.0925 (137) P= .141	.0890 (137) P= .151	.0861 (137) P= .159	.0097 (137) P= .455	.0535 (137) P= .267
AD6	.0173 (137) P= .421	.0117 (137) P= .446	.0446 (137) P= .302	.0345 (137) P= .345	.0588 (137) P= .247	-.0423 (137) P= .312	-.1477 (137) P= .042
AD7	.0157 (137) P= .428	.0544 (137) P= .264	.0411 (137) P= .317	.1282 (137) P= .068	-.1278 (137) P= .068	-.0490 (137) P= .285	-.1528 (137) P= .037
AD8	.0455 (137) P= .299	.1760 (137) P= .020	-.0336 (137) P= .348	.0919 (137) P= .143	-.1284 (137) P= .067	-.0724 (137) P= .200	-.0984 (137) P= .126
AD9	-.0197 (137) P= .410	.0141 (137) P= .435	-.0312 (137) P= .359	.0743 (137) P= .194	.0654 (137) P= .224	-.0066 (137) P= .470	-.0218 (137) P= .400
ACOMP	.1105 (137) P= .099	.0630 (137) P= .232	-.0741 (137) P= .195	.0236 (137) P= .392	-.0885 (137) P= .152	.0718 (137) P= .202	.0218 (137) P= .400
AVTOTDIS	-.0016 (137) P= .492	.1021 (137) P= .118	.0430 (137) P= .309	.1135 (137) P= .093	-.0299 (137) P= .364	-.0227 (137) P= .396	-.0074 (137) P= .466
AVLATE	-.3365 (28) P= .040	-.1682 (28) P= .196	-.0660 (28) P= .369	.0135 (28) P= .473	-.5027 (28) P= .003	-.2317 (28) P= .118	.2673 (28) P= .085
AVABS	. (14) P= .	. (14) P= .	. (14) P= .	. (14) P= .	. (14) P= .	. (14) P= .	. (14) P= .
SHORTS	-.2051 (90) P= .026	-.0295 (90) P= .391	-.0936 (90) P= .190	.0201 (90) P= .425	-.0425 (90) P= .345	-.0544 (90) P= .305	.1107 (90) P= .150
ACOMM	.1030 (137) P= .116	-.1600 (137) P= .031	.0120 (137) P= .445	-.2221 (137) P= .005	.1070 (137) P= .107	-.0232 (137) P= .394	-.1139 (137) P= .093
AA01	-.0915 (137) P= .144	.0587 (137) P= .248	.1881 (137) P= .014	.1468 (137) P= .043	-.0601 (137) P= .243	.0399 (137) P= .322	-.0378 (137) P= .330
AA02	-.0781 (137) P= .182	.1321 (137) P= .062	.0651 (137) P= .225	.0506 (137) P= .278	-.1399 (137) P= .052	-.0152 (137) P= .430	.0761 (137) P= .188
AA03	.0768 (137) P= .186	.1513 (137) P= .039	.1787 (137) P= .018	.0289 (137) P= .369	-.0180 (137) P= .417	.0755 (137) P= .190	-.0197 (137) P= .409
AA04	.0501 (137) P= .280	.1397 (137) P= .052	.0514 (137) P= .276	.0698 (137) P= .209	.1484 (137) P= .042	.0892 (137) P= .150	-.0028 (137) P= .487
AA05	-.1931 (137) P= .012	.0215 (137) P= .402	-.0381 (137) P= .329	.0136 (137) P= .437	-.0497 (137) P= .282	-.0467 (137) P= .294	.1156 (.137) P= .089
AA06	-.1281 (137) P= .068	.0692 (137) P= .211	-.1359 (137) P= .057	-.0938 (137) P= .138	-.1656 (137) P= .027	.0547 (137) P= .263	-.1806 (137) P= .017
AA07	.0464 (137) P= .295	-.0973 (137) P= .129	-.0387 (137) P= .327	-.0250 (137) P= .386	.0171 (137) P= .421	-.0985 (137) P= .126	.1118 (137) P= .097
AA08	.1960 (137) P= .011	-.1418 (137) P= .049	-.0674 (137) P= .217	-.0778 (137) P= .183	.0574 (137) P= .253	-.0027 (137) P= .487	.1451 (137) P= .045
AA09	.0042 (137) P= .481	.0536 (137) P= .267	-.0362 (137) P= .337	-.0937 (137) P= .138	.0641 (137) P= .228	.1786 (137) P= .018	.0401 (137) P= .321
ACOL	-.0508 (137) P= .278	.1307 (137) P= .064	.1904 (137) P= .013	.1544 (137) P= .036	.0073 (137) P= .466	.0762 (137) P= .188	-.0268 (137) P= .378
ANCOL	.0362 (142) P= .334	.0962 (142) P= .127	.1778 (142) P= .017	.1074 (142) P= .102	-.0387 (142) P= .324	.0127 (142) P= .440	-.0566 (142) P= .252
AAD3	-.0013 (137) P= .494	.0831 (137) P= .167	.0113 (137) P= .448	.1030 (137) P= .115	-.0155 (137) P= .428	-.0208 (137) P= .405	.0392 (137) P= .325
AAD6	-.0880 (137) P= .153	.1040 (137) P= .113	.1723 (137) P= .022	.0792 (137) P= .179	-.1117 (137) P= .097	-.0267 (137) P= .378	-.1210 (137) P= .079
AAA3	.0255 (137) P= .384	.0488 (137) P= .286	.0751 (137) P= .191	.0401 (137) P= .321	.1515 (137) P= .039	.1013 (137) P= .119	.0160 (137) P= .426
AAA6	.0069 (137) P= .468	.0246 (137) P= .388	.0074 (137) P= .466	.0083 (137) P= .462	.0817 (137) P= .171	-.0222 (137) P= .398	-.0419 (137) P= .313

Appendix D15: Drivers in small depots (iii)

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5
AD2	.64589	.01512	-.03663	-.05292	-.12322
AD1	.53219	-.06238	.10980	.27699	-.19953
AD5	.50086	.23926	-.04314	.00415	-.44016
AD3	.38644	-.10664	-.05202	.02325	-.22680
AA06	-.34109	-.04622	.07018	.29842	.18248
AA04	.24624	.06835	.10592	.23228	-.02169
ACOMM	-.12035	-.09730	.02583	-.01224	.02360
AA01	.09698	.54437	.02074	.25339	.01766
AA02	-.05804	.30406	.02592	-.11405	-.04395
AD4	.02243	-.04337	-.66271	-.03337	-.15303
AD6	.05226	.01177	-.57139	-.03953	-.13516
AA03	-.00446	.06781	.03610	.78814	-.06454
AD7	.04958	-.03228	-.38831	-.13512	-.77585
AD8	.20322	.05713	-.03320	.10081	-.53817
AA07	.00690	.06409	.04668	.08373	.05334
AA08	-.02111	.19322	-.07172	-.06246	-.04308
AA05	.03393	.10259	-.01295	.06646	.00763

	FACTOR 6	FACTOR 7
AD2	-.06207	.04924
AD1	-.04938	.33813
AD5	-.07032	.15905
AD3	-.10810	-.06898
AA06	.05995	.07391
AA04	-.23047	.12527
ACOMM	-.05364	-.03978
AA01	.06589	.12200
AA02	.13627	.00842
AD4	-.05701	.06933
AD6	.07899	-.08582
AA03	.03127	.09800
AD7	.04850	-.11849
AD8	-.05080	.05937
AA07	.49831	.05722
AA08	.33308	-.03978
AA05	.00825	1.04253

FACTOR CORRELATION MATRIX:

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5
FACTOR 1	1.00000				
FACTOR 2	.07937	1.00000			
FACTOR 3	-.00892	.00708	1.00000		
FACTOR 4	.07030	.01212	.11285	1.00000	
FACTOR 5	-.25541	-.04984	.19521	.03538	1.00000
FACTOR 6	-.10430	.21192	-.06581	-.06133	.02830
FACTOR 7	.12274	.10418	.07436	.19197	.01139

	FACTOR 6	FACTOR 7
FACTOR 6	1.00000	
FACTOR 7	-.01487	1.00000

Appendix D16: Drivers in small depots (iv)

VARIABLE	COMMUNALITY	*	FACTOR	SS LOADINGS	PCT OF VAR	CUM PCT
		*				
WRTRIGHT	.61283	*	1	3.10953	15.5	15.5
WRTWRONG	.81759	*	2	1.85284	9.3	24.8
CFTOTAL	.68046	*	3	1.74675	8.7	33.5
SPFA	.28687	*	4	.84866	4.2	37.8
SPFB	.31434	*	5	.79146	4.0	41.7
SPFC	.62185	*	6	.68580	3.4	45.2
SPFE	.47226	*	7	.64650	3.2	48.4
SPFF	.49618	*				
SPFG	.34329	*				
SPFH	.76411	*				
SPFI	.17417	*				
SPFL	.42165	*				
SPFM	.34888	*				
SPFN	.24499	*				
SPFO	.52219	*				
SPFQ1	.35882	*				
SPFQ2	.44318	*				
SPFQ3	.59473	*				
SPFQ4	.75070	*				
AGE	.41244	*				

OBLIMIN ROTATION 1 FOR EXTRACTION 1 IN ANALYSIS 1 - KAISER NORMALIZATION.

0 OBLIMIN CONVERGED IN 17 ITERATIONS.

VARIABLE	COMMUNALITY	*	FACTOR	SS LOADINGS	PCT OF VAR	CUM PCT
		*				
AD1	.43311	*	1	1.61692	9.5	9.5
AD2	.43141	*	2	.58151	3.4	12.9
AD3	.19903	*	3	1.20469	7.1	20.0
AD4	.46505	*	4	.92314	5.4	25.4
AD5	.40543	*	5	.57202	3.4	28.8
AD6	.33468	*	6	.50800	3.0	31.8
AD7	.69486	*	7	.94843	5.6	37.4
AD8	.31305	*				
ACOMM	.02565	*				
AA01	.36245	*				
AA02	.11978	*				
AA03	.64796	*				
AA04	.16104	*				
AA05	1.11962	*				
AA06	.23351	*				
AA07	.27432	*				
AA08	.13376	*				

OBLIMIN ROTATION 1 FOR EXTRACTION 1 IN ANALYSIS 1 - KAISER NORMALIZATION.

0 OBLIMIN CONVERGED IN 20 ITERATIONS.

0- - - - P E A R S O N C O R R E L A T I O N C O E F F I C I E N T S - - -
0

	PERF1	PERF2	PERF3	PERF4	PERF5	PERF6	PERF7
TEST1	-.0025 (137) P= .488	-.0378 (137) P= .330	-.0073 (137) P= .466	.0264 (137) P= .380	-.0470 (137) P= .293	.0658 (137) P= .222	-.1897 (137) P= .013
TEST2	.0232 (137) P= .394	.0548 (137) P= .262	.0395 (137) P= .323	.1707 (137) P= .023	-.1056 (137) P= .110	-.1279 (137) P= .068	.0217 (137) P= .400
TEST3	.1130 (137) P= .094	.1951 (137) P= .011	-.0100 (137) P= .454	.1825 (137) P= .016	-.0786 (137) P= .180	-.0384 (137) P= .328	-.0186 (137) P= .414
TEST4	.0818 (137) P= .171	.1478 (137) P= .042	-.1086 (137) P= .103	.0310 (137) P= .360	-.1502 (137) P= .040	-.0506 (137) P= .278	.0117 (137) P= .446
TEST5	.1407 (137) P= .051	-.0264 (137) P= .380	.1057 (137) P= .109	-.0019 (137) P= .491	.0794 (137) P= .178	-.0348 (137) P= .343	-.0353 (137) P= .341
TEST6	.0406 (137) P= .319	.0084 (137) P= .461	.0332 (137) P= .350	.0818 (137) P= .171	.0408 (137) P= .318	-.1021 (137) P= .118	-.0374 (137) P= .332
TEST7	.1444 (137) P= .046	.0979 (137) P= .128	.1246 (137) P= .073	-.0459 (137) P= .297	.1169 (137) P= .087	.1444 (137) P= .046	.1396 (137) P= .052

O(COEFFICIENT / (CASES) / 1-TAILED SIG)

Appendix D17: Drivers in large depots (i)

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5
SPFE	.59884	.30195	.11192	-.22865	.17872
SPFL	.45424	.05633	-.10941	-.03935	.13075
SPFQ1	.45028	.00097	.09958	-.25518	.06028
SPFI	-.40561	-.01885	-.19663	-.08131	.15361
SPFN	-.35526	-.16372	-.17746	.30990	-.30939
SPFH	.38355	.70650	.02192	.07473	.21151
SPFF	.44637	.70519	.12653	-.10993	-.10806
SPFQ2	-.01673	-.65621	.07831	-.06175	.06712
SPFA	-.09322	.51797	-.18504	.11252	-.04073
CFTOTAL	.15433	-.05817	.77502	-.11473	-.15116
WRTRIGHT	.03106	-.02663	.69215	-.14919	.02733
AGE	-.21968	-.18697	-.42892	.38458	.42678
SPFB	.12722	-.16253	.42704	.00276	.13977
SPFG	-.13901	.06874	-.08896	.61303	-.04183
SPFQ3	-.13561	.04371	-.05952	.60598	.01341
SPFM	.02007	-.15142	.10874	-.42007	.27264
WRTWRONG	.02821	-.02539	.03199	-.06563	.29690
SPFQ4	.23935	-.09372	.04791	-.19819	.07539
SPFC	-.07100	.22623	.03609	.14077	-.17444
SPFO	-.10110	-.21215	-.13731	-.07753	.02668

	FACTOR 6
SPFE	.06132
SPFL	.38616
SPFQ1	.01580
SPFI	-.00779
SPFN	.05418
SPFH	-.38853
SPFF	-.15026
SPFQ2	.12561
SPFA	-.08590
CFTOTAL	-.07673
WRTRIGHT	-.08822
AGE	.02333
SPFB	.01622
SPFG	-.18765
SPFQ3	-.41668
SPFM	-.12334
WRTWRONG	.09427
SPFQ4	.80869
SPFC	-.75810
SPFO	.74039

FACTOR CORRELATION MATRIX:

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5
FACTOR 1	1.00000				
FACTOR 2	.16332	1.00000			
FACTOR 3	.19795	-.07562	1.00000		
FACTOR 4	-.16412	.02019	-.15763	1.00000	
FACTOR 5	.06993	-.05543	-.02913	-.11158	1.00000
FACTOR 6	.07479	-.16436	-.08931	-.10514	.03242

	FACTOR 6
FACTOR 6	1.00000

Appendix D18: Drivers in large depots (ii)

	TEST1	TEST2	TEST3	TEST4	TEST5	TEST6
AD1	.0966	.0395	.0965	-.0939	-.0326	-.0108
	(426)	(426)	(426)	(426)	(426)	(426)
	P= .023	P= .208	P= .023	P= .026	P= .251	P= .412
AD2	.0355	.0421	.1118	-.0646	.0088	-.0659
	(426)	(426)	(426)	(426)	(426)	(426)
	P= .232	P= .193	P= .011	P= .092	P= .428	P= .087
AD3	-.0039	.0180	.0342	-.0897	-.0506	.0147
	(426)	(426)	(426)	(426)	(426)	(426)
	P= .468	P= .356	P= .240	P= .032	P= .149	P= .381
AD4	.1025	-.0035	-.0021	-.0184	.0471	.0751
	(426)	(426)	(426)	(426)	(426)	(426)
	P= .017	P= .472	P= .482	P= .352	P= .166	P= .061
AD5	.0836	.1143	.0495	-.1306	.0637	.0755
	(426)	(426)	(426)	(426)	(426)	(426)
	P= .042	P= .009	P= .154	P= .003	P= .095	P= .060
AD6	-.0237	-.0533	.0103	-.0781	.0924	.0655
	(426)	(426)	(426)	(426)	(426)	(426)
	P= .313	P= .136	P= .416	P= .054	P= .028	P= .089
AD7	.1229	.0715	.0426	-.0691	-.0175	.0138
	(426)	(426)	(426)	(426)	(426)	(426)
	P= .006	P= .070	P= .190	P= .077	P= .359	P= .388
AD8	.1226	.1739	.0108	-.0401	-.0472	.0432
	(426)	(426)	(426)	(426)	(426)	(426)
	P= .006	P= .000	P= .412	P= .204	P= .166	P= .187
AD9	.0497	.1112	.0408	-.0556	.0177	-.0469
	(426)	(426)	(426)	(426)	(426)	(426)
	P= .153	P= .011	P= .200	P= .126	P= .358	P= .167
ACOMP	.0822	.0259	.0430	-.0913	.0280	.0240
	(426)	(426)	(426)	(426)	(426)	(426)
	P= .045	P= .297	P= .188	P= .030	P= .282	P= .310
AVTOTDIS	.1406	.1390	.1033	-.1360	-.0127	.0203
	(426)	(426)	(426)	(426)	(426)	(426)
	P= .002	P= .002	P= .016	P= .002	P= .397	P= .338
AVLATE	.1121	.1190	.1265	-.1204	-.0488	-.0315
	(348)	(348)	(348)	(348)	(348)	(348)
	P= .018	P= .013	P= .009	P= .012	P= .182	P= .279
AVABS	.1557	.1231	.0571	-.1544	-.1018	.0058
	(347)	(347)	(347)	(347)	(347)	(347)
	P= .002	P= .011	P= .144	P= .002	P= .029	P= .457
SHORTS	.1021	.1115	-.1777	-.1216	-.1170	.0469
	(341)	(341)	(341)	(341)	(341)	(341)
	P= .030	P= .020	P= .000	P= .012	P= .015	P= .194
ACOMM	-.0949	-.0319	-.0268	.0947	.1500	.0273
	(426)	(426)	(426)	(426)	(426)	(426)
	P= .025	P= .256	P= .290	P= .025	P= .001	P= .287
AA01	.0150	.0376	.0955	-.0890	-.0038	-.0949
	(434)	(434)	(434)	(434)	(434)	(434)
	P= .378	P= .217	P= .023	P= .032	P= .468	P= .024
AA02	.0266	.0154	-.0520	-.0673	.0467	.0121
	(434)	(434)	(434)	(434)	(434)	(434)
	P= .290	P= .375	P= .140	P= .081	P= .166	P= .401
AA03	.0748	-.0043	.0440	-.0634	.0121	.0010
	(434)	(434)	(434)	(434)	(434)	(434)
	P= .060	P= .464	P= .180	P= .094	P= .401	P= .492
AA04	.1208	.0384	.1590	-.1275	.0207	.0001
	(434)	(434)	(434)	(434)	(434)	(434)
	P= .006	P= .213	P= .000	P= .004	P= .334	P= .499
AA05	-.0226	.0676	.0310	-.0283	-.0120	-.0196
	(434)	(434)	(434)	(434)	(434)	(434)
	P= .320	P= .080	P= .260	P= .278	P= .402	P= .342
AA06	.0242	.0461	.1159	-.0117	-.0085	-.0896
	(434)	(434)	(434)	(434)	(434)	(434)
	P= .307	P= .169	P= .008	P= .404	P= .430	P= .031
AA07	.0278	.0004	-.0844	-.0809	-.0087	.0886
	(434)	(434)	(434)	(434)	(434)	(434)
	P= .282	P= .497	P= .039	P= .046	P= .428	P= .033
AA08	-.0266	-.0527	-.0044	-.0483	-.0219	.0177
	(434)	(434)	(434)	(434)	(434)	(434)
	P= .290	P= .137	P= .464	P= .157	P= .325	P= .357
AA09	-.0467	-.0428	.0195	-.0293	-.0004	-.1031
	(434)	(434)	(434)	(434)	(434)	(434)
	P= .166	P= .187	P= .342	P= .271	P= .497	P= .016
ACOL	.0726	.0477	.1402	-.1424	.0125	-.0800
	(434)	(434)	(434)	(434)	(434)	(434)
	P= .065	P= .161	P= .002	P= .001	P= .398	P= .048
ANCOL	.0805	.0578	-.0076	-.0779	-.0304	-.0001
	(435)	(435)	(435)	(435)	(435)	(435)
	P= .047	P= .114	P= .437	P= .052	P= .264	P= .499
AAD3	.1486	.0983	.0462	-.1094	-.0430	.0521
	(426)	(426)	(426)	(426)	(426)	(426)
	P= .001	P= .021	P= .170	P= .012	P= .188	P= .142
AAD6	.0332	.0609	.0499	-.1137	.1133	.0047
	(426)	(426)	(426)	(426)	(426)	(426)
	P= .247	P= .105	P= .152	P= .009	P= .010	P= .461
AAA3	.0292	-.0386	.1562	-.0363	.0281	.0463
	(434)	(434)	(434)	(434)	(434)	(434)
	P= .272	P= .211	P= .001	P= .225	P= .280	P= .168
AAA6	.0439	.0375	.0917	-.0357	.0061	-.0796
	(434)	(434)	(434)	(434)	(434)	(434)
	P= .181	P= .218	P= .028	P= .229	P= .450	P= .049

Appendix D19: Drivers in large depots (iii)

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5
AD1	.71185	.02289	-.25629	-.03777	.20178
AA01	.55255	.02714	.18215	-.05378	.03183
AD2	.54930	-.29104	-.02140	-.06944	.28176
AD3	.40705	-.15624	-.11062	-.04459	-.04444
AA07	-.07127	.69079	-.00400	-.00851	-.23300
AA08	-.03711	.45366	-.12168	.01775	-.04655
AD8	.03005	.17803	-.67606	.02382	-.12157
AD7	.09832	.04859	-.55392	-.00776	.19344
AD5	.36970	-.08544	-.38832	.00054	.24161
AA04	.03304	-.03241	-.01363	1.02657	.03956
AA03	-.05025	.02978	.00404	.39019	-.06311
AD4	.13749	-.03597	-.17891	-.04201	.35567
AD6	.27491	.13104	-.05566	.00700	.28551
ACOMM	-.04125	-.14395	.04803	-.02983	.21732
AA06	.41651	-.13181	.07513	.07715	.10914
AA05	-.09942	-.00819	-.02820	.08693	-.09725
AA02	.05492	.07129	.00213	-.04751	-.05894

	FACTOR 6	FACTOR 7
AD1	-.06065	.01017
AA01	-.18992	.41167
AD2	.00967	.26000
AD3	.03069	.21745
AA07	.08155	.13203
AA08	.02890	.00179
AD8	.00650	-.03429
AD7	-.00766	-.04272
AD5	.10690	.23376
AA04	-.41647	.05450
AA03	.04658	-.08959
AD4	.01770	-.03563
AD6	.04143	-.06680
ACOMM	.04091	-.02892
AA06	-.61065	.06548
AA05	-.51524	-.04676
AA02	.02389	.38144

FACTOR CORRELATION MATRIX:

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5
FACTOR 1	1.00000				
FACTOR 2	-.05097	1.00000			
FACTOR 3	-.13045	-.09609	1.00000		
FACTOR 4	-.03281	.03151	-.00974	1.00000	
FACTOR 5	.20402	-.13897	-.08730	-.04955	1.00000
FACTOR 6	-.05891	.03377	-.05181	-.11384	.05393
FACTOR 7	.22533	-.02849	.02906	-.08963	-.09583

	FACTOR 6	FACTOR 7
FACTOR 6	1.00000	
FACTOR 7	.00259	1.00000

Appendix D20: Drivers in large depots (iv)

VARIABLE	COMMUNALITY	FACTOR	SS LOADINGS	PCT OF VAR	CUM PCT
WRTRIGHT	.49928	1	2.28022	11.4	11.4
WRTWRONG	.09817	2	2.66962	13.3	24.7
CFTOTAL	.61749	3	1.66477	8.3	33.1
SPFA	.31656	4	.77855	3.9	37.0
SPFB	.23424	5	.79778	4.0	41.0
SPFC	.60891	6	.58594	2.9	43.9
SPFE	.44268				
SPFF	.63869				
SPFG	.39521				
SPFH	.73301				
SPFI	.23479				
SPFL	.36966				
SPFM	.28524				
SPFN	.29479				
SPFO	.58030				
SPFQ1	.24374				
SPFQ2	.44063				
SPFQ3	.50190				
SPFQ4	.70074				
AGE	.54084				

OBLIMIN ROTATION 1 FOR EXTRACTION 1 IN ANALYSIS 1 - KAISER NORMALIZATION.

0 OBLIMIN CONVERGED IN 36 ITERATIONS.

VARIABLE	COMMUNALITY	FACTOR	SS LOADINGS	PCT OF VAR	CUM PCT
AD1	.55939	1	1.82654	10.7	10.7
AD2	.41825	2	1.05048	6.2	16.9
AD3	.22966	3	.81683	4.8	21.7
AD4	.15187	4	1.28619	7.6	29.3
AD5	.33329	5	.50637	3.0	32.3
AD6	.17266	6	.52504	3.1	35.4
AD7	.33060	7	.30423	1.8	37.2
AD8	.49915				
ACOMM	.07168				
AA01	.48009				
AA02	.15365				
AA03	.16667				
AA04	1.18190				
AA05	.29086				
AA06	.53885				
AA07	.52363				
AA08	.21349				

OBLIMIN ROTATION 1 FOR EXTRACTION 1 IN ANALYSIS 1 - KAISER NORMALIZATION.

0 OBLIMIN CONVERGED IN 40 ITERATIONS.

0- - - - - - - - - - - - - - P E A R S O N   C O R R E L A T I O N   C O E F F I C I E N T S - - - -
0

	PERF1	PERF2	PERF3	PERF4	PERF5	PERF6	PERF7
TEST1	.0773	.0310	-.1530	.1126	.0434	-.0270	.0294
	(425)	(425)	(425)	(425)	(425)	(425)	(425)
	P= .056	P= .262	P= .001	P= .010	P= .186	P= .289	P= .273
TEST2	.0543	-.0079	-.1534	.0019	-.0382	-.0626	.0704
	(425)	(425)	(425)	(425)	(425)	(425)	(425)
	P= .132	P= .435	P= .001	P= .485	P= .216	P= .099	P= .074
TEST3	.1249	-.0839	-.0260	.1443	.0746	-.1261	.0298
	(425)	(425)	(425)	(425)	(425)	(425)	(425)
	P= .005	P= .042	P= .296	P= .001	P= .062	P= .005	P= .270
TEST4	-.1277	-.0717	.0913	-.1100	-.0242	.0258	-.1147
	(425)	(425)	(425)	(425)	(425)	(425)	(425)
	P= .004	P= .070	P= .030	P= .012	P= .310	P= .298	P= .009
TEST5	-.0100	-.0122	.0261	.0080	.1186	.0232	.0236
	(425)	(425)	(425)	(425)	(425)	(425)	(425)
	P= .418	P= .401	P= .296	P= .435	P= .007	P= .317	P= .314
TEST6	-.0370	.0840	-.0785	.0110	.0291	.0816	-.0297
	(425)	(425)	(425)	(425)	(425)	(425)	(425)
	P= .223	P= .042	P= .053	P= .411	P= .275	P= .046	P= .271

0(COEFFICIENT / (CASES) / 1-TAILED SIG)   " . " IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED

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DRIVER RESEARCH PROJECT

We are Edinburgh academics, doing research into how people cope with their jobs.

The Scottish Bus Group is helping us study the bus driver's job; your colleagues on the negotiating committee are also supporting our efforts. Our research will not in anyway affect the employment of existing drivers.

We may be able to discover the cause of some of the stresses a driver experiences (this would interest your union). We might be able to suggest new ways of recruiting drivers (which the Group are interested in).

Around 1,000 Drivers will be taking part in this project, and will be asked to complete four, straightforward questionnaires. This will take approximately 1½ - 2 hours. Your replies to these questionnaires will be seen by no-one but ourselves at the University, and as academics we are bound by strict rules of confidentiality. Your results will be used solely for research purposes.

A general report about this project will go both to the Group and the Union, and any publications based on the study will be freely available. If you would like a brief personal summary of your results, write to us and we will be pleased to let you know quite soon.

Here are some examples of the sorts of questions asked. The first three questionnaires are timed; in the last you can answer at your own pace and leave as soon as you finish. Each shall be fully explained when we meet.

The first questionnaire tests how well you can follow simple directions. You must put a cross in a box indicated to you by a direction.

For example, count from the left below and cross boxes 3, 6 and 8.

L ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ R

In the second questionnaire you are asked to recognise words which have not been properly printed. For example: